DOCUMENT RESUME

ED 097 216 SE 018 223

TITLE Nutrition and the Growing Population. Environmental Education Curriculum. Revised.
INSTITUTION Topeka Public Schools, Kans.
SPONS AGENCY Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE Nov 73
NOTE 143p.; Best copy available; Occasional marginal legibility

EDRS PRICE MF-$0.75 HC-$6.60 PLUS POSTAGE
DESCRIPTORS Curriculum Guides; Demography; *Environmental Education; Environmental Influences; *Health Education; Health Needs; Instruction; Instructional Materials; *Nutrition; Nutrition Instruction; *Population Education; *Secondary School Science
IDENTIFIERS Elementary Secondary Education Act Title III; ESEA Title III

ABSTRACT

This unit attempts to respond to the increasing problems of malnutrition in the United States seemingly related to rising market prices, low quality foods attracting the consumer dollar and the shrinking number of students studying nutrition in our schools. It is designed to enable secondary school students to evaluate food selections, understand the problems connected with malnutrition and consider the effort needed to maintain our present level of nutrition as populations continue to grow. Four basic topics are presented: (1) Basic Nutritional Needs of Humans; (2) Scientific Techniques Used in Determining Nutritional Requirements; (3) Processing, Preservation and Future Supplies of Food; and (4) Prenatal Development and the Role Played by Nutrition. Optional areas are presented including consumer tips and the pet population explosion. The culminating activity is a field trip to a research laboratory specializing in pet and zoo animal nutrition. Teaching aid materials include behavioral objectives of the unit, a suggested time line, appropriate methodologies, suggested equipment and evaluative instruments. (MLB)

environmental education curriculum

BEST COPY AVAILABLE

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
[illegible]

ED 097216

ENVIRONMENTAL EDUCATION PROJECT
ESEA TITLE III, SECTION 306

Topeka Public and Parochial Schools
1601 Van Buren, Topeka, Kansas 66612
Phone: 913-232-9374

A module developed by the Environmental Education Project Staff, September, 1972, revised November, 1973, for secondary science students.

Donald French, Project Coordinator
Robert King, Program Specialist - Secondary
Glenn Clarkson, Program Specialist - Elementary
Thad Whiteaker, Program Specialist - Special Education

BEST COPY AVAILABLE

NUTRITION
AND THE
GROWING
POPULATION

The work presented or reported herein was performed pursuant to a grant from the United States Office of Education. However, the opinions and material expressed herein do not necessarily reflect the position or policy of the U. S. Office of Education, and no official endorsement by the U. S. Office of Education should be inferred.

Nutrition and the Growing Population

Foreword

For many people in today's world, the most pressing environmental problem is not air or water pollution, disappearing wildlife, or even the energy crisis. It is food! Malnutrition, not starvation, probably affects well over one-third of the people living in today's world. Malnutrition shortens lifespan, limits intelligence, increases disease suseptibility, and creates misery in old age. It is caused by limited amounts of the right foods throughout the world. However, in our country it is usually caused by poor selection of available foods. Of particular concern to educators, is the fact that many studies have shown that our teenage mothers are often selecting meals for their families that are not nutritionally balanced, particularly with respect to protein, iron, and calcium. The resultant deficiencies play a key role in retarding mental and physical development of the children and parents of these families. Three trends are increasing this problem: market prices continue to rise; tasty, low quality foods are attracting a growing share of the consumer dollar; and the number of students studying nutrition in our schools is shrinking yearly.

With this in mind, the Environmental Education Project and target teachers have developed this module to provide enough nutritional knowledge to enable students to wisely evaluate their own food selections, to understand the problems of malnutrition throughout the world, and to consider the efforts needed if even our present level of nutrition is to be maintained as populations continue to grow.

The module contains four basic topics: 1) Basic Nutritional Needs of Humans, 2) Scientific Techniques Used in Determining Nutritional Requirements of all Animals (Including Man); 3) Food - Processing, Preservation, and Future Supplies; 4) Prenatal Development and the Role Played by Nutrition.

Two broad optional areas are also presented in papers, films, and activities within the module: 1) Consumer Tips - food purchasing, advertising practices, and quackery in the reducing field; 2) The Pet Population Explosion.

These topics are developed with class and personal activities, films, papers, and a field trip to Theracon, Inc. (a contract research laboratory specializing in pet and zoo animal nutrition).

The achievement of the stated goals is guided with behavioral objectives, teacher suggestions, and questions to the students with each activity, film, and paper. The achievement is measured with carefully written and evaluated tests based on the behavioral objectives.

Robert E. King

Robert E. King
Secondary Program Specialist

BEST COPY AVAILABLE

ACKNOWLEDGMENT

The Environmental Education Project for the Topeka Public and Parochial Schools began operation June 29, 1971. The following individuals deserve recognition for the interest, time, and devotion they gave during the difficult stages of planning and writing the project proposal:

Mr. John Ganger, Coordinator of Curriculum for Special Education
Mr. W. I. Green, Director of Special Education
Dr. Quinton Groves, Director of Health, Physical Education, Safety and Athletics
Mr. Clarence "Tuffy" Kellogg, Assistant Director of Health, Physical Education and Safety
Mr. Stanley Martin, Science Supervisor
Mr. Claude Ritchie, Principal, Gage Elementary School
Mr. William Wagaman, Principal, Avondale East Elementary School
Mr. Lawrence R. Gaston, Director of Federal Programs
Dr. Gilbert Wehmeier, Principal, Curtis Junior High School

The needed support given the project by Dr. Merle R. Bolton, superintendent of schools; other members of the central administrative staff; the instruction department; personnel office; business office; data processing department; maintenance department; and Lawrence Gaston, director of federal programs, is gratefully acknowledged.

Special recognition is given to the Board of Education for the Topeka Public Schools, who approved and are supporting this creative, exemplary, and innovative project.

My sincere gratitude is extended to the program specialists for their tireless efforts in developing this secondary module. Curriculum development and revision has extended the working days for these staff members. My personal thanks are given to Bob King, Glenn Clarkson, and Thad Whiteaker for an outstanding job.

The enclosed curriculum is the result of input from the project's paraprofessionals and volunteers, science and home economics teachers, and supervisors, Community Council members, parents, students, and interested lay citizens.

Mr. Al Stuke of Theracon, Inc., must receive special thanks for assisting in the development of materials and in coordinating our many field trips. Further thanks must go to the Topeka-Shawnee County Health Department, Hill's Division of Riviana Foods, Shawnee County Home Extension agents, the Better Business Bureau, the Dairy Council, and the many other community organizations that have provided suggestions and material to further the development of this module. T. W. Mack and Eulalia Lewis are responsible for the fine sketches.

With the deepest appreciation, I acknowledge the work of the secretarial team. The constant revisions, pressures, deadlines, and demands for quality work were handled in a most outstanding manner by Dorothy Booher, Peggy Ketter, Dianne Reser and Debbie McArdle.

Donald French
Donald French
Project Coordinator

BEST COPY AVAILABLE

TABLE OF CONTENTS

Title Page. i
Foreword. ii
Acknowledgment. iii
Table of Contents iv
Module Goals. 1
Use of Teaching Materials 1
Suggested Time Line for Module Activities 2
Module Materials List 4
Film Descriptions 5
A Word About Behavioral Objectives. 6
Behavioral Objectives 8
Class Performance Summary Sheet 11

Student Papers and Teaching Suggestions

Introduction . . . . .A: 1- 2
Nutrition and You. . . . . .B: 1-10
Food for Life. . . . . .C: 1- 3
Nutrition Word Games .D: 1- 4
Food Values of Commonly Eaten Foods. . . . . .E: 1-22
Theracon - History & Function. . . . . .F: 1- 4
Nutritional Analysis .G: 1- 7
Food Processing at Hill's. . . . . .H: 1- 7
Nutrition & the Growing Population . . . . .I: 1- 7
Food Additives . . . . .J: 1- 7
Tragedy of the Commons . . . . .K: 1- 5
Stretching the Dollar. . . . . .L: 1- 3
Stretching the Dollar - Resource Materials . . . . .M: 1- 3
Would You Use This Additive? . . . . .N: 1- 3
Diet Schemes - Fact and Fiction. . . . . .O: 1- 3
The Fat Fighters . . . . .P: 1- 2
Have a Healthy Baby. .Q: 1- 3
The Animals are Crying . . . . .R: 1- 2

The Field Trip

Topics and Concepts. .S: 1
Suggestions for use of the Field Trip Forms. . . . . .S: 1
"Requests to Principal for Field Trip" forms . . . . .S: 2
"Parental Permission" forms. . . . . .S: 3
Planning for the Substitute. . . . . .S: 4
Pre-Field Trip Lecture Suggestions . . . . .S: 4
Field Trip Schedule. .S: 4
Directions for the Trip Guides . . . . .S: 5
Saving Money and Energy .T: 1- 3

Transparencies

Daily Food Chart 1
Nutrition Word Games (Scrambler) 2
Nutrition Word Games (Crossword Puzzle). 3
Contents of Two Dog Foods. 3A

NUTRITION AND THE GROWING POPULATION

The basic module focuses on four broad and interlocking concepts:

1) Basic nutritional needs of humans.

2) Scientific techniques used in studying nutritional requirements of all animals (including man).

3) Food - its processing, preservation, and future supplies.

4) Prenatal development and the role played by nutrition.

Optional concepts presented in papers, films, and activities within the module:

1) Consumer tips - food purchasing, advertising practices, and quackery in the reducing field.

2) The pet population explosion.

USE OF TEACHING MATERIALS

The suggested time line (page 2-4) for this module is provided to allow easier planning.

The "Module Materials List" (page 4) indicates the supplies you need to obtain to teach the module. The materials are listed in the sequence required for class use.

Film descriptions (page 5) describe suggested and optional films.

The behavioral objectives outline the concepts and abilities that most of your class should gain from studying this unit. Pages 6 and 7 provide a brief summary of the development and use of the behavioral objectives in our unit.

Following each of the student papers, you will find sheets of green paper. These pages contain: 1) Behavioral objectives tied to the paper; 2) Suggestions for presenting the papers; and 3) Answers to the student self-test questions. Particular attention should be given to the film material before presenting the films.

The posttest for this module is included with the correct answers circled. This is to allow you to see the types of questions keyed to the behavioral objectives. Please do not teach the questions, as many are designed to require interpretation and extrapolation, not rote memorization.

Student pre and posttest results will be reported using this form.

Suggested Time Line for Module Activities

This module has optional activities which could extend the teaching time of this module by 5 hours. Therefore, the time line is written in the ideal sequence of events with the time required for teaching each activity indicated in parenthesis. After determining which optional activities you wish to use, you can tailor the time line to your own needs. Write the day or days planned for each activity in the blank spaces to the left.

Day Before the Field Trip

Arrange the field trip date with the project staff, and obtain the student pretests. Obtain approval for the field trip dates from the building principal (use Paper S-2). Invite him to visit the field trip. Schedule a speaker from the Better Business Bureau (Activity 10) 232-0454 if desired.

Locate the classroom materials and begin duplicating all of the required forms, papers, and materials listed on page 4, "Module Materials List."

_____30 min. 1. Give the pre-test.

_____30 min. 2. Read and discuss the "Introduction", Paper A.

_____60 min. 3. Read and discuss paper B, "Nutrition and You."

_____30 min. 4. Use the Dairy Council Flash Cards to help students visualize the relationship between various nutrients and the food groups. Pages B-7 and B-8 provide suggestions for the cards.

_____30 min. 5. Show and discuss the film Food for Life and paper C.

_____15+ min. 6. Duplicate and assign pages D-1 and D-2 "Nutrition Word Games." Obtain an overhead projector to use with transparencies 2 and 3 in providing the answers to the class.

_____60+ min. 7. Duplicate four copies of page E-13 for each student. Assign each student the task of recording on one of these pages the amount and identity of everything eaten for one day. Use paper E, "Food Values of Commonly Eaten Foods" the following day. Locate an overhead projector and transparency marking pencils. One or more adding machines could be useful with this exercise.

Note: The project will supply interested students copies of this paper. Determine how many would use it, and call the office with the nose count.

_____30 min. (optional) 8. Paper O, "Diet Schemes, Fact or Fiction" could be used well at this point.

_____30 min. (optional) 9. Paper P and the film The Fat Fighters could also be inserted here.

_____30 min. (optional) 10. A speaker from the Better Business Bureau would be able to talk to your class about Diet Quackey, Food Labeling, sales practices of various stores or a variety of other subjects if desired.

> Duplicate Parental Permission slips, page S-3 and encourage each student to invite their parents to attend the trip. (Parents will be separated from their students during the trip.)

_____30 min. 11. Assign and discuss paper F, "Theracon-History and Function."

_____60 min. 12. Assign and discuss paper G, "Nutritional Analysis." The teacher should read pages 3-12 in "Canine Dietetics" before presenting this paper.

_____40^{+} min. (optional) 13. View the film The Animals are Crying and discuss paper R. Humane Society Pamphlets are available from the Environmental Education Project Office if individuals in your class wish to pursue this topic in more depth.

_____60 min. 14. Read paper H "Food Processing at Hill's" and view the film Hill's.

_____30 min. (optional) 15. Read and discuss paper L "Stretching the Dollar."

_____10 min. (optional) 16. Point out the existence of paper M "Stretching the Dollar Resource Material" and describe the activities of the various agencies mentioned in the paper.

> Remind students to return parental permission slips. Check to make sure that your trip permission has cleared proper channels. Ask your principal to consider taking the field trip.

_____60 min. 17. Read and discuss paper I "Nutrition and the Growing Population."

_____60 min. 18. Read and discuss paper J "Food Additives."

> Remind students to return parental permission slips. Notify other teachers of the students who will be taking the field trips. Call the Environmental Education Office and double check the trip times, place of departure, number of students participating, and number of Food Value Charts requested, guide requirements, and substitute teacher arrangements.

_____60 min. (optional) 19. View the film Have a Healthy Baby and discuss paper Q.

_____30 min. (optional) 20. Read and discuss paper N "Would you use this Additive?"

_____90 min. 21. View and discuss the film Tragedy of the Commons using paper K. Allow two class periods to show the film.

_____15 min. 22. Give students the appropriate set of field trip rules and regulations, as contained in paper S. Prepare your lesson plans for the substitute.

_____15 min. (optional) 23. Duplicate paper T, "Saving Money & Energy" if you wish to use it with your students.

_____120 min. 24. Field Trip: Give the substitute teacher your instructions. Organize the student permission slips, and bring them on the trip. Guide a small group if possible.

_____60 min. 25. Use the list of behavioral objectives in the front of the teacher's manual and the field trip information in paper S to review the unit.

_____30-40 min. 26. Give the final test, fill out the unit evaluation forms, and return all forms to the project office. Test results will be returned in about 10 school days.

Module Materials List

The following list contains the materials which you should have to teach this module. The materials are organized in the sequence of use.

1. Teacher's Guide to the Module.
2. One "Nutrition and the Growing Population" student booklet per student.
3. Three "Requests to Principal for Field Trip" forms per trip (Duplicate pages S-2)
4. One "Parental Permission" sheet per student and 10 extra copies/class.
5. Pre-module tests and answer sheets.
6. Pre-module test results - 10 days after returning the answer sheets to the project.
7. 1 set, Dairy Council Flash Cards.
8. Daily Food Charts (four/student) - (Duplicate page E-18).
9. Overhead projector, wax transparency marking pencils.
10. One or more simple, durable adding machines, if possible.
11. Copies of Canine Dietetics and Feline Dietetics
12. Student copies of paper T "Saving Money & Energy" (Duplicate paper T, pages 1 and 2)
13. Post-module teacher evaluation packet.
14. Post-module tests and answer sheets.
15. Post-module test results.

Film Descriptions

The following 16mm films may be obtained from the Topeka Public Schools Audio-visual Department. The films are listed in the sequence recommended for this module.

Food for Life, (AF) - color, 22 min.

This is an excellent film which looks at four types of malnutrition: Lack of enough food, surplus of food, low protein diets, and poorly selected diets. It focuses on the lives of four teenagers with these problems, and explains contributions of the four food groups, and ways that malnutrition may be avoided in the future. The film is available from the Topeka Public Schools Film Library, or the Kansas Health Education Library.

The Fat Fighters, (Brigham Young University) - color, 23 min. (Optional)

This film provides a candid look at one group of overweight women attempting to deal with the complex problems associated with obesity. It is not a success story with all of the right answers, but does suggest some approaches for reaching the multiple - causes of this common problem.

The Animals are Crying (PMS) - color, 33 min. (Optional)

This film shows the results of overbreeding by our house pets, and the attitudes of many people toward their pets. It examines the work of the Humane Society, describes the value of having dogs spayed, and shows the advantages of adopting dogs from the Humane Society.

Hill's - color, 15 min. (Optional)

This film provides a short description of the processing and testing of the Hill's pet food products. This film is provided by the Hill's Division of Riviana Foods, Inc.

Have a Healthy Baby (CF) - color, 16 min. (Optional)

The development of a baby is followed from the time of conception to birth. The film emphasizes that the mother must care for herself to insure a healthy baby. It is one of the best films we've seen on prenatal development and the effects poor nutrition, drugs, and disease can have on babies. It can be borrowed from the Topeka - Shawnee County Health Association, or the Kansas Health Education Film Library.

Tragedy of the Commons (HRW) - color, 22 min.

This is a superb film which requires at least two class periods to present and discuss properly. It presents the world as a commons - shared in common by all men. It then proceeds to examine man's influence and future on the world. The teacher's guide must be studied thoroughly before presenting the film properly. The film is broken into four portions to allow discussion sessions between each portion.

A Word About Behavioral Objectives

The goals of this module are defined through the use of behavioral objectives. The behavioral objectives establish a predetermined goal toward which learning is to be directed and by which attainment may be measured. This unit is intended to develop student changes in both the cognitive (knowledge) and the affective (attitude) domains. The behavioral objectives for this unit contain these basic parts:

1) The concept, or skill being evaluated.
2) The method by which the evaluation will occur (multiple-choice).
3) The expected criterion (percent of students who should correctly respond).
4) The Bloom's taxonomy level at which the concept will be tested.
5) The audience (participating students).
6) The expected behavior (selecting the best answer).

The present trend in education is toward stricter educational accountability. Behavioral objectives help define some of the desired outcomes for which education can be accountable.

Student learning is not all at the same level. For example, direct recall of a fact requires fewer mental manipulations than applying a concept to a new situation. One system for indicating the level of difficulty of a desired response is through the use of Bloom's taxonomy. The higher the Bloom's number assigned to an objective, the higher the level of desired competence with a particular concept. Following are descriptions of Bloom's levels assigned to each objective.

Cognitive Objectives

Knowledge Level

1.12 Knowledge of Specific Facts
1.21 Knowledge of Convention
1.22 Knowledge of Trends and Sequences
1.23 Knowledge of Classifications and Categories
1.24 Knowledge of Criteria
1.25 Knowledge of Methodology
1.30 Knowledge of Universals and Abstractions in a field
1.31 Knowledge of Principles and Generalizations
1.32 Knowledge of Theories and Structures

Intellectual Level (Cognitive)

2.10 Translation
2.20 Interpretation
2.30 Extrapolation
3.00 Application
4.10 Analysis of Elements
4.20 Analysis of Relationships

Affective Objectives

1.0 Receiving Level

- 1.1 Awareness
- 1.2 Willingness to Receive
- 1.3 Controlled or Selected Attention

2.0 Responding Level

- 2.1 Acquiescence in Responding
- 2.2 Willingness to Respond
- 2.3 Satisfaction in Response

3.0 Valuing Level

- 3.1 Acceptance of Value
- 3.2 Preference for a Value
- 3.3 Commitment

4.0 Organization Level

- 4.1 Conceptualization of a Value
- 4.2 Organization of a Value System

Affective Objectives
(Continued)

The following behavioral objectives are intended to give teachers direction during the teaching of this unit. The behavioral objectives define only key concepts basic to the entire unit. They do not define all the learning experiences that will occur. The objectives will be revised as more student data becomes available. This data will provide the necessary information to calculate realistic criterion levels.

Please teach with the objectives, not the test questions, in mind. For the knowledge level objectives, students are expected to know specific things. However, for the intellectual level objectives, students are expected to take knowledge, apply it to an unfamiliar situation, and determine the best answer. Teaching the test question turns a level 2, 3, or 4 test question into a level 1, or knowledge level question.

Behavioral Objective Number	Test Question Number	Concept Tested	Bloom's Taxonomy Question Level	Pre - Post Growth Criterion	Activities Developing Objectives
1		Attitude questions are answered completely and truthfully. (as measured by a & b below) a) 90 percent of all students will respond to each opinion question. b) No more than 10 percent of the students will use patterned responses for unit evaluation questions.	2.2A		All
2	57*	Environmental Education Project modules are worth studying. *Post test question only	3.2A	70%*	All
3	38	All schools should teach more about the ways the environment affects people, and people affect their environment.	3.2A	10%	All
4	1	Match the correct food group with a set of its four most important nutrients.	1.23C	30%	B,C,D,E,S
5	17	Select the set of 3 foods which can best supply good quantities of iron.	1.23C	30%	B,D,E,S
6	2	Fats and carbohydrates should supply most of a person's energy requirements.	1.12C	45%	B,C,D,G,H,S
7	18	Vitamins and minerals are primarily used in assisting cellular activities in the body.	1.23C	30%	B,C,D,S
8	3	During pregnancy, the mother needs to eat slightly more from the fruit & fresh vegetable, milk, and meat groups.	1.12C	30%	B,D,E,Q,S
9	19	Select from a set of four meals, a nutritionally balanced, inexpensive, and low calorie lunch.	2.20C	35%	B,C,E,S
10	4	Water is essential for every chemical process in the body.	1.12C	25%	B,D,S
11	20	Select the best definition of malnutrition.	1.31C	35%	B,C,O,P,S
12	30	Students try to keep their daily diets nutritionally balanced.	3.2A	10%	B,C,E,O,P,Q,S

Module: 4

Behavioral Objective Number	Test Question Number	Concept Tested	Bloom's Taxonomy Question Level	Pre - Post Growth Criterion	Activities Developing Objectives
13	5	Select from a list of specific foods, the food best able to provide good quantities of all amino acids.	2.20C	25%	C,D,E,G,H, I,S
14	21	Select the nutrient in shortest supply throughout the world.	1.12C	45%	C,D,I,S
15	6	Nutritionally balanced diets cannot be made from a single food source.	1.31C	35%	C,E,G,H,O, S
16	22	Select the correct comparison of the fiber, protein, and mineral contents in two common foods.	2.30C	30%	E,G,S
17	7	Theracon is an independent laboratory doing research under contract for other companies.	1.12C	50%	F,S
18	23	Surgery is one technique not utilized in nutritional analysis at Theracon.	1.25C	20%	F,S
19	8	Select from a list, the types of tests which Theracon uses to analyze a new diet.	1.25C	40%	F,G,S
20	24	Theracon keeps its animals outside to restrict the spread of disease.	1.24C	50%	F,S
21	9	From a set of four diets, select the one which is both nutritious and palatable for most humans.	3.00C	25%	G,I,S
22	25	From a set of four food ingredients, select the one which humans cannot digest.	1.12C	40%	G,S
23	10	Select the best sentence explaining the value of cereals in the food of carnivores.	2.20C	10%	G,H,S
24	26	Given the costs and quantities of four foods consumed by an animal, select the most economical food.	2.20C	15%	G,H,L,S
25	11	Good nutrition is most critical during growth and pregnancy.	1.12C	35%	G,H,I,N,Q, S

Behavioral Objective Number	Test Question Number	Concept Tested	Bloom's Taxonomy Question Level	Pre - Post Growth Criterion	Activities Developing Objectives
26	32	Human foods should have accurate and usable information describing the nutritional value of the food displayed on the food package.	2.3A	10%	H,I,J,L, S
27	12	Match two types of additives with their uses in food processing.	1.12C	20%	I,J,S
28	27	Low levels of minerals & protein most frequently causes permanent mental & physical damage in humans.	1.12C	45%	I,Q,S
29	13	Select the best statement evaluating the potential of various new foods for fulfilling the world protein requirements.	1.24C	30%	I,S
30	28	Evaluate the potential for improving crop yields using present farming techniques.	1.31C	30%	I,S
31	14	Select the best summary statement about the conclusion of the film "Tragedy of the Commons."	4.10C	25%	K
32	33	Society should work to supply nutritious food at a price which each family can afford.	2.1A	10%	K,Q,S
33	34-37	Every society should encourage every human to practice good environmental use techniques.	3.3A	10%	J,K,S
34	15	Select the most important step in accurately determining the nutrients in a food.	1.25C	35%	S
35	29	Bacteria which thrive at high temperatures may not be killed during canning.	2.10C	40%	S
36	16	When stored properly, canned food will remain usable for more than a year.	1.12C	40%	S
37	31	Theracon's dogs & cats are treated pretty well, except when their research might be testing a poor diet.	2.1A	30%	S

CLASS PERFORMANCE SUMMARY SHEET

The following pages indicate how your class(es) responded to the pre and post-module tests. The following code is used throughout the test.

A - Percentage of students responding correctly on the pre-module test.

B - Percentage of students responding correctly on the post-module test.

C - Percent growth expected between pre and post-module tests.

D - Phi score for the test item. This score shows the quality of the test questions. Phi scores below 25 indicate either a poor test item or a topic that was not taught well in the unit. Phi scores above 40 indicate a very good test item which was well taught.

The opinion questions have two scores listed for each test result. "+" scores indicate the percentage of students agreeing with the statement and "-" scores indicate those disagreeing. The students with no opinion make up the remaining and unreported percentage.

The correct answers are circled.

A ____ B ____

C 30% D ____

1. Which one of the food groups contains high quantities of calcium, protein, fat and riboflavin?

[✓ a.] milk group
b. meat group
c. bread and cereal
d. fruit and fresh vegetables

A ____ B ____

C 45% D ____

2. Which pair of nutrients should supply most of a person's energy requirements?

a. fats and vitamins
b. carbohydrates and minerals
c. proteins and vitamins
[✓ d.] fats and carbohydrates

A ____ B ____

C 30% D ____

3. How many more servings of which food groups should be eaten during pregnancy.

	Milk	Meat	Vegetables & Fruits	Bread & Cereal
a.	1 more	1 more	Same	Same
b.	Same	2 more	2 more	Same
[✓ c.]	1 more	1 more	1 more	Same
d.	2 more	2 more	2 more	1 more

A ____ B ____

C 25% D ____

4. Which one of these substances is required for every chemical process in the body?

a. vitamin C
b. calcium
[✓ c.] water
d. carbohydrate

___ A ___ B

25% C ___ D

5. Select the food which contains the best mixture of amino acids.

a. whole wheat bread
b. spinach
[✓ c.] meat loaf
d. oranges

___ A ___ B

35% C ___ D

6. What best explains why cat food is not usually made of pure meat?

a. Pure meat is too expensive
b. Cats will refuse to eat a steady diet of meat.
[✓ c.] A pure meat diet is not nutritional.
d. Pure meat has a low biological value and low digestibility.

___ A ___ B

50% C ___ D

7. The Theracon Laboratory is:

a. part of Hill's
b. part of the State Health Labs
[✓ c.] a contract research lab
d. a branch of the National Institute of Health Labs

___ A ___ B

40% C ___ D

8. From the list below, choose the group of tests Theracon runs on every diet before approving it for manufacture and use.

a. 2, 5
b. 2, 3, 4
c. 1, 2, 3, 5
[✓ d.] 1, 2, 3, 4, 5

1. Will the food cause diarrhea?
2. Will an animal prefer one food to another?
3. Will the food keep a nursing mother healthy?
4. Will the materials for the diet be easily obtained?
5. Will the food look and smell right to the person buying the food?

___ A ___ B

25% C ___ D

9. Which of these four diets is both nutritious and palatable for most Americans?

a. Liver, broccoli, buttermilk, rye bread.
b. Hot dogs, french fries, and a milk shake.
c. Macaroni and cheese, french toast, and chocolate milk.
[✓ d.] Hamburger and bun, tomato and lettuce salad, ice cream.

___ A ___ B

10% C ___ D

10. Which sentence best explains why people and dogs should eat cereals such as wheat and corn?

[✓ a.] Cereals supply calories so that proteins can be used to build.
b. Only cereals and fat can supply the body's energy requirements.
c. Cereals act as an economical replacement for animal protein.
d. Cereals provide good quantities of most of the essential minerals for a diet.

___ A ___ B

35% C ___ D

11. Good nutrition is always important, but is most critical during:

a. growth and old age
b. pregnancy and old age
[✓ c.] growth and pregnancy
d. pregnancy, heavy work periods, and middle age

A	B
20% C	D

12. Which of the answers below correctly matches the two types of additives and their use in foods.

a. 1=A, 2=B
b. 1=B, 2=C
[✓ c.] 1=A, 2=D
d. 1=C, 2=A

1. Anti-oxidants, used with fruits, oils, & cake mixes
2. Emulsifiers, used with candy, ice cream, & mayonnaise

a. Keeps mold from growing.
b. Adds flavor and body to a food.
c. Keeps food moist and soft.
d. Keeps food well mixed.

A	B
30% C	D

13. Which of these statements is true?

a. Synthetic foods can provide inexpensive nutritious diets.
b. Fish meal can supply enough inexpensive protein to balance the diets of most poor countries.
[✓ c.] Artificial meat made of soybeans can be made in large quantities, but it is expensive.
d. Cereals, such as rice and wheat, supply the required levels of nutrients for diets throughout the world.

A	B
25% C	D

14. According to the arguments presented in the film, "Tragedy of the Commons," which of these statements best summarizes man's future?

a. Man will not abuse his environment if everyone is given education and the right to follow his own conscience.
b. Technology will take care of the world's problems, since it rapidly changes to fit the needs of each nation.
[✓ c.] Unless governments throughout the world take strong steps to control population growth and environmental abuse, the quality of life will worsen.
d. The United States has enough land and resources to care for our population at the rate it is growing.

A	B
35% C	D

15. To accurately measure the amount of fat, protein, and minerals in a food, what is the first thing to do to the food?

a. dissolve it in ether
b. Dissolve it in acid
c. burn it in an ashing oven
[✓ d.] dry it in a drying oven

A	B
40% C	D

16. If a can of food is kept dry and sealed at temperatures under 90 degrees F., how long could it be stored before it could not be used with complete safety?

a. three months
b. six months
c. nine months
[✓ d.] over a year

___ A ___ B
30% C ___ D

17. Which set of foods provides three good sources of iron?

a. corn, spinach, & cheese
b. gizzards, carrots & cheese
[✓ c.] baked beans, pork chops, peanut butter
d. lettuce, cereal & eggs

___ A ___ B
30% C ___ D

18. Which statement best explains the role filled by vitamins and minerals in nutritional requirements?

a. Vitamins and minerals provide energy to the body.
[✓ b.] Vitamins and minerals assist many activities by the cells.
c. Vitamins and minerals build most of the body's organs.
d. Vitamins and minerals only build bones, teeth, and muscles.

___ A ___ B
35% C ___ D

19. Select the meal which could most cheaply and with the fewest calories provide one-third of your daily nutritional needs.

a. tuna fish salad, bread & orange juice
b. macaroni and cheese, skim milk and corn
[✓ c.] baked beans with pork, tomatoes and milk
d. pork chops, green beans, french fries and milk

___ A ___ B
35% C ___ D

20. Select the best statement.

a. People are malnourished because they do not eat food with enough energy in it.
[✓ b.] Overweight, as well as underweight people could be suffering from malnutrition.
c. People who are malnourished will starve to death if they do not begin to get more food.
d. Men are most often malnourished since they require more proteins and vitamins than women.

___ A ___ B
45% C ___ D

21. Low levels of which one of these nutrients causes the greatest problem throughout the world?

a. fats
[✓ b.] proteins
c. carbohydrates
d. vitamin C

___ A ___ B
30% C ___ D

22. Select the line which best shows the amounts of fiber, protein and minerals in lettuce and cottage cheese.

	Lettuce			Cottage Cheese		
	Fiber	Protein	Minerals	Fiber	Protein	Minerals
a.	low	low	high	low	high	low
b.	high	low	high	high	high	high
c.	low	high	low	low	low	high
[✓ d.]	high	low	low	low	high	high

____ ____ 23. Select one thing which is seldom done at Theracon.
A B

20% ____
C D

a. Animal's feces are analyzed.
b. The amount of food eaten is measured.
c. Blood tests are run.
[✓ d.] Intestinal surgery is analyzed.

____ ____ 24. What is the main reason that Theracon keeps most of its cats and dogs outside?
A B

50% ____
C D

a. Because too much noise can affect a dog's metabolism.
[✓ b.] To keep the spread of disease to a minimum.
c. To provide better tests for food energy requirements.
d. To allow better testing conditions for palatability and diarrhea.

____ ____ 25. Select the one material which is never digested by man, dogs, or cats, and is an essential part of our food.
A B

40% ____
C D

a. fat
[✓ b.] fiber
c. vitamin A
d. plant protein

____ ____ 26. Four kinds of food were fed to average-sized dogs. From the average daily feedings, pick the most economical food. All four foods kept the dogs healthy.
A B

20% ____
C D

a. Canned food, dog ate 2 pounds per day, food cost 35 cents per pound.
b. Canned food, dog ate 3 pounds per day, food cost 20 cents per pound.
[✓ c.] Dried food, dog ate 0.6 pounds per day, food cost 30 cents per pound.
d. Dried food, dog ate 0.4 pounds per day, food cost 50 cents per pound.

____ ____ 27. Low levels of which set of nutrients most frequently causes damage to mental and physical ability of humans?
A B

45% ____
C D

a. carbohydrates and vitamins
b. vitamins and fats
c. calcium and fats
[✓ d.] minerals and protein

____ ____ 28. Using the common methods of farming now in use, which of these statements is correct?
A B

30% ____
C D

a. We could grow much more food in tropical areas.
[✓ b.] We would cause much more erosion if we farmed more land in the United States.
c. Most of Russia's good farm land is not being farmed, but could be.
d. We could increase the world's good farm land by one-third with irrigation.

____ A ____ B

40% C ____ D

29. You should not store canned foods in places where the temperature will go over 100 degrees F. Why?

    [✓ a.] Because some bacteria is not always killed during canning.
    b. Because this heat destroys vitamins and proteins in the food.
    c. Because expansion of the food may cause the can to leak.
    d. Because 100 degree temperatures will quickly change the flavor of the food.

PART B

Your answers on the last part of this test will be used to determine what you think about some of the ideas contained in the unit.

A B
a ____ ____
b ____ ____
c ____ ____
d ____ ____

30. Choose the correct statement about your eating habits.

    a. I usually eat nutritionally balanced meals.
    b. I don't know whether or not my meals are nutritionally balanced.
    c. I don't care whether or not my meals are nutritionally balanced.
    d. I don't usually eat nutritionally balanced meals.

____ +A- ____ +B-

31. How do you feel about this statement: "Theracon's dogs and cats are treated pretty well, except when their research might be testing a poor diet."

    a. I think the statement is probably correct.
    b. I really couldn't guess if it is correct or not.
    c. I think the statement is probably incorrect.

Mark the direction society should take on each of these positions:

a. Society should take strong steps toward this goal.
b. Society should move toward this goal, but slowly.
c. Society should remain as it is.
d. Society should slowly move to oppose this goal.
e. Society should take rapid steps to oppose this goal.

____ +A- ____ +B-

32. Human foods should be required to provide accurate and usable information on the food package about the nutritional value of the food, even if it costs an extra penny a package. A B C D E

____ +A- ____ +B-

33. We should make sure that every family in America can obtain adequate supplies of food at a cost they can afford. A B C D E

____ +A- ____ +B-

34. Starting in 1980, every family which gives birth to its third or more child should pay more taxes for each new child. A B C D E

____ +A- ____ +B-

35. The United States should work to encourage every country to bring its population growth under control. A B C D E

_____ _____ 36. Anybody should be fined for allowing land to erode when it could be protected at a reasonable cost. A B C D E
+A- +B-

_____ _____ 37. I should be able to use the environment any way I want without Government restrictions. A B C D E
+A- +B-

_____ _____ 38. All schools should teach more about the ways the environment affects people, and people affect their environment. A B C D E
+A- +B-

PART C

Your answers to questions 39-58 will help us determine what you think of the module in general. Please use this key:

A = Yes (or I agree) B = I'm not sure C = No (or I disagree)

______ +B- 39. I think we had to go through this module too fast. A B C

______ +B- 40. I think our class discussions were interesting and informative. A B C

______ +B- 41. I think our substitute teacher was adequately prepared to present the material. (Mark D if you had no substitute.) A B C

______ +B- 42. My teacher helped answer most of my questions about ideas presented in this module. A B C

______ +B- 43. I think we used the self-test questions in a way that helped me learn and think. A B C

______ +B- 44. We discussed the films in a way that helped each of us learn and think. A B C

______ +B- 45. I think my teacher enjoyed teaching this module. A B C

______ +B- 46. I think most other students enjoyed studying this module. A B C

______ +B_ 47. Most of the necessary papers and supplies were ready when we needed them. A B C

______ +B- 48. I think that most of the questions asked by this test were fair. A B C

______ +B- 49. I think the papers in this module contain useful and interesting information. A B C

______ +B- 50. I think the papers in the module could be easily read. A B C

______ +B- 51. I think the ideas covered in this module fit together pretty well. A B C

______ +B- 52. The films used in the module were interesting and useful. A B C

______ +B- 53. I enjoyed taking the trip, and I learned a lot. A B C

______ +B- 54. The trip leaders did a good job helping me learn on the trip. A B C

______ +B- 55. I discussed some of the things in this module with my family or friends. A B C

______ +B- 56. I think the activities and exercises in this module were interesting and useful. A B C

______ +B- 57. Overall, I think this module was well worth the time we spent studying it in class. A B C

______ +B- 58. I would like to study other modules developed by the Environmental Education Project. A B C

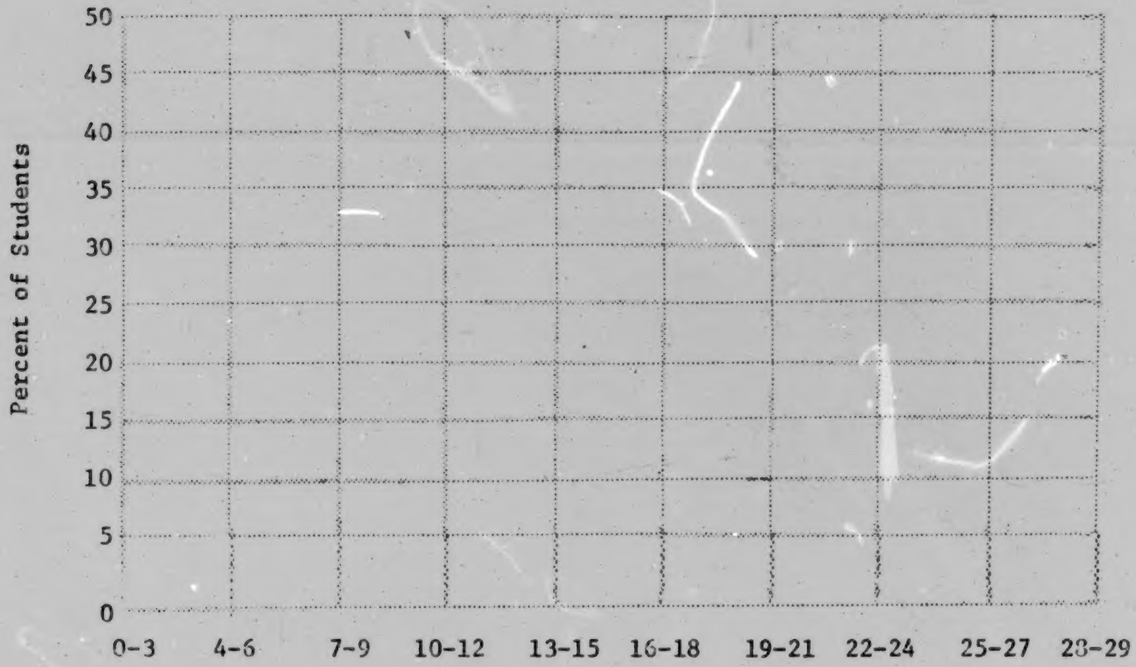
BEST COPY AVAILABLE

Percent of students answering the least answered attitude question__________.

Percent of students using patterned responses on the attitude questions____________________.

Class Mean__________________ Standard Deviation__________________

Frequency Polygon (--- = pre,____ = post)



The Topeka Public and Parochial Schools
Unified School District No. 501
Environmental Education Demonstration Project

Module: 4 Paper A

INTRODUCTION

The Environmental Education Project was created by the Topeka school systems to help you learn about your environment. The project develops and tests materials for classroom and field trip activities. This module focuses on human nutrition and its effect on the world around us. No part of your environment will influence your success and health more than your diet and the diets of people throughout the world. A good diet depends on the correct selection of food and whether or not proper foods are available.

The module you are about to study is built around four main ideas:

1) Basic nutritional needs of humans.

2) Scientific techniques used in determining nutritional requirements of all animals (including man).

3) Food processing, preservation, and future supplies.

4) Prenatal development and the effects of foods, drugs, and disease.

The module also includes papers and films about two other ideas which your teacher and you may choose to study.

1) Consumer tips - food purchasing, advertising practices, and quackery in the reducing field.

2) The pet population explosion problem.

Following your study of this module, your class will take a field trip to Theracon, Inc., a nutritional research laboratory for pets and zoo animals.

The Environmental Education Project uses test results to determine what you learned from the module and what you think about different parts of it. You will be given tests over the module before and after you study it. The tests will be used to determine what changes should be made in the material. Whether or not the teacher grades you using these test results is a decision to be made by your teacher. Test questions will be drawn from the field trip worksheet and student self-test questions with each paper.

All of your answers to the factual test questions will be reported to your teacher for use in grading, if desired. The test will also contain a set of questions about your opinions. Your answers to these questions will be used by the Environmental Education staff to improve the material you are studying.

Green pages in the teacher's material usually will contain three sections:

1) "Topics and Concepts" - lists the ideas from the student papers and exercises that will be on the final test. The numbers of the topics correspond with the behavioral objectives listed in the front portion of this module.

2) "Teacher Suggestions" - provides background material and suggestions for presenting the paper or exercise.

3) "Answers to Student Self-Test Questions" - provides answers and follow-up material to help in a discussion and review of the self-test.

This introductory paper is concerned with the following three attitudes. They will be nurtured throughout the next two weeks as the students work with this module.

TOPICS AND CONCEPTS TESTED

1) Students should read each opinion question on the final test and try to respond truthfully.

2) Upon completion of this module, students should indicate a desire to study other modules developed by the Environmental Education Project.

3) Upon completion of this module, students should indicate a desire to study more material about man's relationship to his environment.

TEACHER SUGGESTIONS

Please bring out three points during the introduction:

1) This module is about nutrition, a subject which plays a very large role in every persons' (males and females) health, success, and ability to cope with life. People who are always tired, overweight, underweight, or having trouble learning in school may all be having problems caused by poor nutrition. This module will try to quickly and concisely give enough information to help interested students develop better nutritional patterns.

2) The project is very interested in student and teacher opinions, criticisms, and compliments. We get these comments during the field trip, from teachers' verbal and written comments, and from opinion questions on the student test. Please encourage students to react to the material being presented. Pass their reactions and yours on to us.

3) You should make it clear if students will be graded using the factual part of the posttest. The tests are fair, and are strictly based on the behavioral objectives included in this module. If the students understand each paper's student self-test questions and the field trip material, they should do very well on the posttest.

Nutrition and You

Malnutrition wears many masks in America. It may be found in the overweight, the sleepy and tired, the old and crippled, those whose hair and skin is dry, and slowly growing or brain damaged children. Malnutrition occurs whenever a person or animal does not eat a diet which keeps him fit, healthy, and alert. Many Americans suffer malnutrition, but no group of Americans suffers more than the teenagers, particularly teenage girls and mothers.

Nutrients

Nutrients are chemicals in food that build and provide energy for the body. Chart I on page 2 names the major nutrients which should be included in a balanced diet, gives examples of foods which contain the nutrients, and indicates the function of the nutrient in the body.

As you look through this chart, you should keep in mind that every nutrient is required by the body. An extra supply of one will not do the job of another. For instance, several nutrients on the list will supply energy. Proteins and carbohydrates will supply about the same amount of energy (or calories) while fats will supply about two and one-fourth times more, pound for pound. However, only proteins can supply some of the necessary materials needed to build brain cells, body organs, hair, and so on. Only fat can provide the necessary fatty acids for healthy skin and for carrying vitamins throughout the body. Only carbohydrates can supply a ready source of quick energy. Therefore, a person's diet must contain foods with all nutrients if good health is to be maintained.

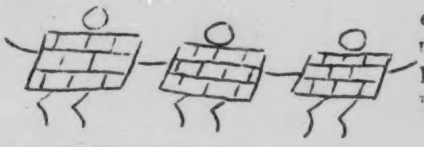
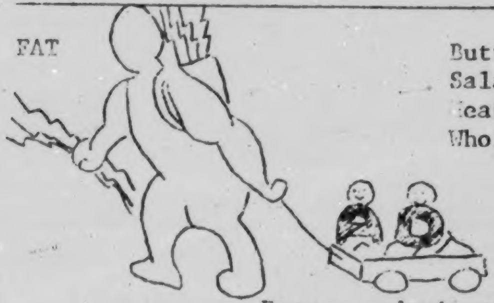
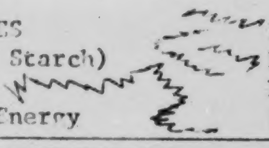
Water - The Basic Requirement

One essential for a good diet was omitted from the chart since it is easily obtained from many sources. Water makes up most of the weight of the total body. A loss of only one-tenth of it will result in death. Water regulates body temperature, carries wastes to the kidneys, and helps carry oxygen, food, antibodies, and hormones to all parts of the body. Yet, many parents forget to give their young children enough water; teenagers may not drink enough when exercising; and older people sometimes cut back on water to avoid the necessity of going to the restroom.

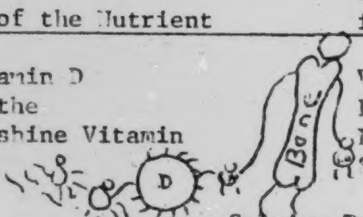
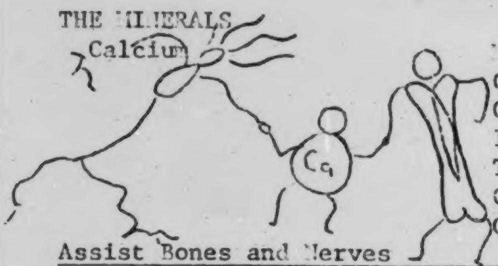
In young children, lack of energy or poor appetites may indicate a lack of enough water. At all ages, health damage may not appear immediately. Continued low intake of water will put strain on the kidneys and bladder. This strain may not cause noticeable damage for several years; and by the time the damage is noticed, it may cause severe problems.

Most adults should be sure to drink at least five glasses of liquid, containing water, every day in addition to eating the food necessary for a balanced diet. Active teenagers should drink even more.

Chart 1. Nutrients: Their Foods and Uses

Name of the Nutrient	Foods that supply important amounts	Some reasons why you need it
PROTEIN  Building Blocks	Meat, fish, poultry, eggs, cheese, and milk. Peanut butter, nuts Dried beans and peas	To build and repair all tissues in the body. To help form "antibodies" in the blood which fight infection. To form good hair and fingernails. To supply energy.
FAT  Energy and vitamin towing	Butter and cream Salad oils and dressings Meats Whole milk, ice cream	To supply a large amount of reserve energy in a small amount of food. To help keep skin smooth and healthy by supplying substances called "essential fatty acids." To carry Vitamins A and D.
CARBOHYDRATES (Sugars and Starch)  Rapid Energy	Breads and cereals Potatoes and corn Preserved fruits Sugar, syrup, and jelly	To supply quick energy.
THE VITAMINS Vitamin A Disease Resistence	Yellow fruit, dark green and yellow vegetables Cream Cheddar-type cheese, Ice cream Liver, eggs	To help produce healthy skin and mucous membranes. To protect against night blindness and promote healthy eyes.
Thiamin Riboflavin and Niacin (B Vitamins) Energy Releaser	Meat, fish and poultry Eggs, dried peas and beans Milk, cheese, and ice cream Whole grain and enriched breads and cereals White potatoes	To help the body release energy from food. To help the nervous system. To help keep appetite and digestion normal.
Vitamin C or Ascorbic Acid Cell Cementer	Citrus fruits--lemon, orange, grapefruit, lime, strawberries, canteloupe Tomatoes Raw or lightly cooked greens, cabbage White potatoes Green peppers, broccoli	To make cementing materials that hold body cells together. To make walls of blood vessels firm. To help resist infection. To help prevent fatigue. To help in healing wounds and broken bones.

BEST COPY AVAILABLE

Name of the Nutrient	Foods that supply important amounts	Some reasons why you need it
Vitamin D or the Sunshine Vitamin Calcium Transport	Vitamin D milk Butter Fish liver oil Sunshine (not a food!)	To help the body absorb calcium from digestive tract. To help build calcium and phosphorus into bones.
THE MINERALS Calcium Assist Bones and Nerves	Milk Cheese, especially Cheddar-type Ice cream Turnip and mustard greens Collards, kale, broccoli Canned sardines, salmon	To help build bones, teeth. To help make blood clot. To help muscles react normally. To delay fatigue and help tired muscles recover.
Iodine Control Energy	Sea Foods Iodized salt	To make thyroxine, an essential hormone that controls the rate the body burns food.
Iron Carry Oxygen	Liver Meat and eggs Green leafy vegetables Raisins, dried apricots	To combine with protein to make hemoglobin, the red substance in the blood that carries oxygen to the cells

Adapted from Choose Your Calories by the Company They Keep," published by the National Dairy Council.

The Four Food Groups

As you probably noticed on Chart 1, many foods show up time and time again beside the various nutrients. Therefore, dietitians have placed foods into four main groups for ease of planning diets. These groups are the milk group, the meat group, the vegetable and fruit group, and the bread and cereal group.

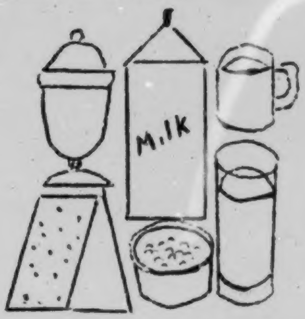
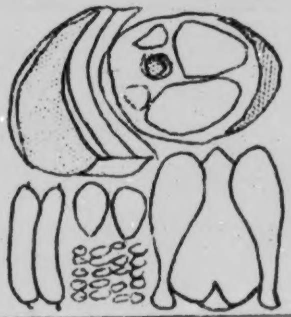
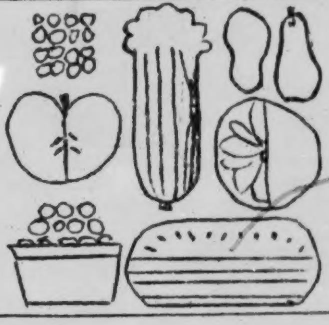
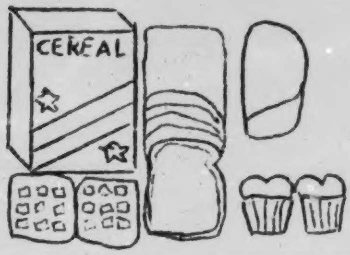
Because teenagers are still growing, they should eat more than adults of the foods which supply proteins, minerals, and vitamins. This includes the first three food groups. They don't need to eat a lot of the breads and cereals, since these mostly supply calories and increased amounts of the other food groups will take care of the increased calorie needs.

Chart II lists the four food groups and gives recommended servings for teenagers, adults, and during pregnancy. A serving for a girl is usually a little smaller than for a boy since most girls are smaller and less active. Serving size is determined by the size, activity, and rate of growth of the person.

BEST COPY AVAILABLE

Chart II. Daily Food Requirements by Food Group

Use Daily:

Groups	No. Servings	Size of Servings	
Milk Group			
Milk, cheese, ice cream, and other milk-made foods, can supply these requirements.	4 or more for teenagers 2 or more for adults 1 extra for pregnancy	1 cup of milk or its equivalent	
Meat Group			
Meats, fish, poultry, eggs, peanuts, beans, peas, and nuts can help supply these requirements	2 or more servings for teenagers and adults. 1 more small serving needed during pregnancy.	2 oz. of meat for women, 3 oz. for men.	
Vegetable and Fruits			
Dark green or yellow vegetables, citrus fruits, and tomatoes.	4 or more servings for teenagers and adults. 1 extra serving during pregnancy.	1/2 cup of fruit or vegetables per serving	
Bread and Cereals			
Enriched or whole grain breads and cereals	4 or more servings for teenagers, adults, and during pregnancy	1 slice of bread or its equivalent per serving.	

Doctors have found that patients who eat the kinds and amounts of food listed in these charts, and get enough sleep, will usually find themselves alert, healthy, and not needing to depend on cokes, coffee, or other drugs to "keep awake and alert."

If a person weighs about what he should, and gets hungry with these servings, he should snack on foods from the first three groups. Desserts and soft drinks supply mostly calories; and cost as much as nutritious foods, so they should be avoided.

If a person is overweight and does not lose weight on these servings, he should be sure to cut back on high calorie foods from within the food groups, such as butter, fried meats, and vegetables with high carbohydrate levels. He should continue to eat low calorie foods from all four groups, such as salads, skim milk, green beans, cottage cheese, broiled meat, and so on. Under no circumstances should a person try to lose weight by cutting out all of one or two of the food groups. He'll eventually lose his health along with his weight.

STUDENT SELF-TEST

1. Write down four nutrients supplied by the milk group, meat group, and vegetable and fruit group. Find two nutrients supplied by the bread and cereal group. Are any nutrients supplied by all groups?

2. What are the three nutrients that can supply calories (energy) to the body?

3. Which one of the actions in the list below best summarizes the way that most vitamins and minerals work to help the body?

   a) Supply energy
   b) Resist infection
   c) Release energy
   d) Build cells
   e) Digest food
   f) Destroy wastes
   g) Assist cell activities

4. Is it correct to say, "She needs to eat more bread because she's eating for two"? Why?

5. Suggest three inexpensive foods which have a lot of protein and iron.

6. Which of the chemicals in food is the most critical requirement for life?

TOPICS AND CONCEPTS

4) Students should be able to match the correct food group with a set of its four most important nutrients.

5) Students should be able to select a set of three foods which are all rich in iron.

6) Students should indicate that fats and carbohydrates supply most of a person's energy requirements.

7) Students should indicate that vitamins and minerals are primarily used in assisting cellular activities in the body.

8) Students should indicate that during pregnancy the mother needs to eat slightly more from the fruit and fresh vegetable, milk, and meat groups.

9) From a set of four meals, students should be able to select a nutritionally balanced meal which is inexpensive and low in calories.

10) Students should indicate that water is the most essential chemical in food.

11) Students should be able to select the best definition of malnutrition.

12) Students should try to keep their daily diets nutritionally balanced.

SUGGESTIONS FOR PRESENTATION OF PAPER B

Assign this paper with the accompanying "Student Self-Test" as homework. Point out to the students that their test is made from the concepts covered by the questions on the self-test. Suggest that students read the student self-test questions, then read the unit and answer the questions.

Review the "Student Self-Test" questions as a class. We would suggest that you quickly check each student's answer sheet to see if an effort was made to answer the questions. If you grade on homework, a simple note of the number of questions answered by each student will provide an indication of student effort, so long as the assignments are graded periodically for content to encourage honest efforts each time. In any case, the goal of the questions is to help make sure that the students work to utilize the concepts needed to answer each question. A good class discussion of each question will help students reach this goal. Be sure to see if there are student questions about vocabulary used in the charts or texts of this paper. This is a key paper for the entire unit.

One difficulty most students have with this paper is in distinguishing nutrients from food groups. Point out that nutrients (iron, vitamin A, etc.) are like the letters that make words. The "words" are the food groups. Several nutrients are needed to make any "word," and the same nutrients may appear in several different food groups.

Papers C, D, and E, and the food chart activity described below will all help meet the objectives of this paper. Use the Student Self-Test questions to introduce the basic concepts, then use the later papers to help cement the concepts into a workable framework for students.

Food Chart Activity

An indexed set of flash cards (which can be obtained free from the Dairy Council of Greater Kansas City, 45th and Van Brunt Ext., Kansas City, Missouri 64130), showing the contributions of fifty foods to a teenager's nutrient requirements is supplied with each module. These can best be used following a discussion of Paper B, "Nutrition and You," or Paper C, "Food for Life."

Organize the charts into this sequence:

Sequence	Chart No.	Sequence	Chart No.
1. Milk, Whole	1	13. Peanutbutter Sandwich	22
2. Meat Patties	11	14. Carrots	25
3. Green Beans	23	15. Potatoes	26
4. Liver	17	16. Chocolate Milk	3
5. Bread and Butter	38	17. Banana	34
6. Cheese, Cheddar	5	18. Sweet Roll	41
7. Fish, Haddock	16	19. Pizza	42
8. Cooked Cereal	39	20. Soft Drink	47
9. Sweet Potatoes	29	21. Buttermilk or Skim Milk	2
10. Ice Cream	8	22. Cookie	46
11. Frosted Layer Cake	45	23. Egg	19
12. Macaroni and Cheese	20	24. Tomato	31

The other 26 cards should be arranged in the order of their card numbers. Now, cover the names for each chart with a paperclipped 4 x 6 card or some other similar piece of paper so that the name of the food is not visible.

Before presenting the cards, place the headings, "milk," "meat," "bread and cereal," "vegetable and fruit," and "other" in a prominent position on the chalk or bulletin boards so that the class can easily see them. After identifying the first food from each of these groups, tape the appropriate chart below its heading and leave displayed throughout the exercise.

Begin the review by explaining the milk chart (Number 1) to the students. Point out that the height of the bar graphs indicate the contributions of the food to the student's daily requirements and that the top of each graph represents 33 percent of the daily food requirements. Thirty-three percent of the daily requirement should be obtained with each meal. These bars are taken from the same figures as are contained in the tables used with Paper E.

Once the milk chart has been discussed, place it on the board beneath the heading "milk," and then display the meat patties chart with its label covered. Ask students to classify this card, both by its food group and the specific food. After several students have guessed, expose the chart and place it on the board.

Continue on through the first five cards this way. Note that liver was in position number 4. This was to discourage the student's tendency to guess "bread and cereal" with the fourth card, and also to emphasize the nutritional value of liver.

Continue on through the cards, asking different students to estimate the food group for each card. Have each student justify his estimation in terms of which nutrients are high and low on the chart. Following each estimation, expose the title and place the chart under the appropriate heading. After the first nine charts are up, have the students compare each of the food groups with each other. Bring out these generalities.

1. In the meat group, protein is usually much higher than calories and iron is higher than calcium. This group usually has good niacin.

2. In the milk group, protein is higher than calories, and calcium usually much higher than iron.

3. In the breads group, protein and calories are about equal, and about as high or higher than any other nutrient.

4. In the vegetable group, ascorbic acid (Vitamin C) is always higher than calories, and Vitamin A is usually high in green and orange vegetables.

5. Some of each of the food groups is necessary in order to get enough of all of the necessary nutrients for a balanced diet.

Following this review, continue through the cards, asking each student to give his estimate of the group each new chart belongs under, justification of the estimate, and a guess of its identity. Make sure to select every student at some point, whether or not they volunteer to answer. Use those with their hands up to support or disagree with the student you first selected to answer the question. Strive to get a lively, game-like atmosphere with all students involved.

Three points which should come up as you go through the cards: 1) Desserts (placed in the "Other" category) have more calories than nutrients. Ice cream and butter fit into a kind of milk - "Other" category. 2) Mixed foods such as macaroni and cheese and pizza fit in a mixed group category since they have good amounts of the milk and meat group characteristics. 3) Baked beans and peanutbutter are in the meat group because of their nutritional characteristics.

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. Write down four nutrients supplied by the milk group, meat group, and vegetable and fruit group. Find two nutrients supplied by the bread and cereal group. Are any nutrients supplied in good quantities by all groups?

A The milk group supplies protein, fat, vitamins A, B, D, and calcium.

The meat group supplies proteins, fat, B vitamins, and iron.

The vegetable and fruit group can supply vitamins A, C, calcium, and iron.

The bread and cereal group supplies some protein, carbohydrates, and B vitamins. (Enriched cereals can also supply iron and other vitamins.)

No nutrient can be well supplied by all groups (and no group contains good supplies of all nutrients).

Suggestion:

Following this question point out that most nutrients can be supplied by at least two food groups. However, each food group supplies at least one nutrient which cannot be obtained without eating large quantities of food from another group. Therefore, it is best to eat small amounts from all food groups to obtain the proper nutrients without excess calories.

Q 2. What are the three nutrients that can supply calories (energy) to the body?

A Proteins, carbohydrates, and fats all supply energy.

Q 3. Which one of the actions in the list below best summarizes the way that most vitamins and minerals help the body?

a) Supply energy
b) Resist infection
c) Release energy
d) Build cells
e) Digest food
f) Destroy wastes
g) Assists cel activities

A Most minerals and vitamins help the many cells of the body by regulating and assisting cell activities. The list below justifies this answer.

a) No minerals or vitamins are used to supply energy.

b) Vitamins A and C help the body resist infection.

c) The B vitamins help release energy from food.

d) No vitamins or minerals "build cells," although their presence is required for successful growth.

e) None of the vitamins or minerals digest food in the G. I. tract.

f) None of the vitamins or minerals destroy wastes, although hemoglobin helps remove CO_2 from the body.

g) Vitamin A increases the vitality of mucous membranes. The B vitamins provide several valuable enzymes for cell digestive processes. Vitamin D is an important part of the mechanism used to transport and utilize calcium in the cells; calcium is essential in encouraging reactions of nerves, muscles, and platelets. Iodine is used in one of the key hormones of the body; and iron is a key ingredient of hemoglobin, which is responsible for transporting oxygen in and carbon dioxide out of the body.

Q 4. Is it correct to say, "She needs to eat more bread because she's eating for two"? Why?

A No--during pregnancy, intake of all food groups except bread and cereal should increase slightly. During pregnancy, a woman needs more proteins, fats, minerals, and vitamins to build the child and herself. As the extra nutrients are consumed in the other food groups, they'll supply enough extra calories without more of the bread and cereal group being needed. When pregnant, a woman should eat about one serving more of all food groups except the breads and cereals. A teenage girl should eat even more than that in all food groups except breads since she is still growing, as well as her child.

Q 5. Suggest three inexpensive foods which have a lot of protein and iron.

A Peanuts, beans, and eggs are all inexpensive sources of protein and iron. (Some meat is also needed to supply a few missing amino acids if mostly plant proteins are eaten. However, the beans and peanuts could provide most of the body's protein requirements. The subject of amino acids will arise in later papers.)

Q 6. Which of the chemicals in food is the most critical requirement for life?

A Water.

NOTE: Ask this follow-up question:

How does water affect the body?

Water participates in every chemical action in the body. Water carries all of the food, wastes, regulatory chemicals, and blood cells in the body. Low levels of water intake put strain on every body organ, particularly the kidneys and bladder.

FOOD FOR LIFE

The film "Food for Life" examines the effects and causes of four common types of malnutrition: starvation, Kwashiorkor, borderline deficiencies, and overweight.

Starvation is caused by low levels of most nutrients. The symptoms of this most severe form of malnutrition include stunted growth, catching diseases easily, tiring easily, lowered mental ability, and under extreme conditions, even death. This type of malnutrition usually occurs during droughts when people are unable to grow or purchase enough food. It is frequently accompanied by raging epidemics of disease, which can easily attack the weakened people.

Kwashiorkor is caused by shortages in the supply of essential amino acids. Your body cannot make the molecules and cells necessary for life if all of the proper amino acids are not contained in your diets. Amino acids are like letters in a word. If you wish to spell "cat," "apple," or "human," you could not succeed without the letter "a" no matter how many of the other letters are available. Good supplies of all amino acids are found in the animal proteins, but plant proteins often lack one or more essential amino acids. The symptoms of Kwashiorkor include stunted mental and physical growth, bloated stomachs, oozing sores, and frequent illness. Humans usually do not die from Kwashiorkor, but they do die from other diseases which attack the weakened people. Nearly one-third of the world's population suffers from some degree of Kwashiorkor.

Borderline deficiencies are caused by diets with the wrong combinations of nutrients. This is a frequent cause of distress for teenage girls and young mothers. The problem is not severe enough to cause death, but may result in lack of energy, poor skin and hair condition, trouble concentrating, and so on. Data from animal studies also indicates that poor teenage nutrition may damage the liver, kidney, and other body organs. This damage may not appear until middle age is reached.

Overweight is the final form of malnutrition discussed in the film. Its damage to the body is usually even more serious than borderline deficiencies. Overeating places strain on the heart, blood vessels, bones, muscles, and personality. Thus, it is the most commonly discussed form of malnutrition in the United States.

STUDENT SELF-TEST QUESTIONS

1) What caused the malnutrition shown by Tara in India, Karen in the United States, Emelio in Columbia, and Bob in the United States?

2) What is a good definition for malnutrition?

3) Name four different foods which can supply all of the essential amino acids?

4) Which nutrient was supplying most of Karen's calories?

5) Were the solutions to the problems shown in the film realistic?

TOPICS AND CONCEPTS

4) Students should be able to match the correct food group with a set of its four most important nutrients.

6) Students should indicate that fats and carbohydrates supply most of a person's energy requirements.

9) From a set of four meals, students should be able to select a nutritionally balanced meal which is inexpensive and low in calories.

11) Students should be able to select the best definition of malnutrition.

12) Students should try to keep their daily diets nutritionally balanced.

13) Students should be able to select the food best able to provide good quantities of all amino acids.

14) Students should be able to select the nutrient in shortest supply throughout the world.

15) Students should indicate that a nutritionally balanced diet cannot be made from a single food source.

SUGGESTIONS FOR PRESENTATION OF PAPER C

This film provides a good preview of many concepts in the module. Key concepts include: 1) the necessity of having adequate amounts of protein in the diet, 2) the need for proteins containing all of the amino acids our body requires, 3) the importance of selecting nutritionally balanced meals every meal, 4) the relationship between work and the demand for calories, and 5) the difficulty inherent in the suggestions that world nutrition problems can easily be solved with modern technology.

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. What caused the malnutrition shown by Tara in India, Karen in the United States, Emelio in Columbia, and Bob in the United States?

A. 1) Tara - unreliable sources and not enough quantity of most foods. Starvation was her worry. She probably had some protein deficiencies even when she is eating well (for her).

2) Karen in the United States - poor selection of available foods is causing borderline deficiencies. Her diet is probably low in vitamins, protein, fat, and iron.

3) Emelio in Columbia - not enough protein of high quality is in his diet. He will not starve, but will never reach his full growth or health potential due to the effects of Kwashiorkor.

4) Bob in the United States - too much food, not enough exercise. Will suffer from overweight and all of its accompanying ailments.

Q 2. What is a good definition for malnutrition?

A. Malnutrition is the diet-caused state of health which limits the health or the full physical and mental development of an organism. Malnutrition may occur whenever too much of one nutrient (vitamins, proteins, or iron for instance), too much of all nutrients, too little of one nutrient, or too little of all nutrients are consumed. There is a wide latitude of acceptable nutritional intake from day to day; but over each month, the nutritional intake should balance out if damage is to be avoided.

Q 3. Name four kinds of food that can supply all of the essential amino acids.

A. Milk, eggs, and meat from all vertebrate animals (fish, pigs, cattle, chickens, etc.) will supply all of the essential amino acids if eaten in quantity. Proteins from plants (beans, peas, peanuts, jello, etc.) will usually have low levels of one or more of the essential amino acids.

NOTE: Be sure that students understand that the good plant protein sources listed above can supply most of the amino acid requirements, but some source of animal protein or amino acid additives are required if the human is to get all amino acids.

Q 4. Which nutrient was supplying most of Karen's calories?

A. Karen was depending primarily on carbohydrates for her energy, thus, she frequently "ran out" of energy between meals. Her tiredness and skin problems were due to the low fat intake. Her low protein and iron intake was reflected in the dull hair and, to some extent, her tiredness.

Q 5. Were the solutions to the problems shown in the film realistic?

A. The class should realize that most of the solutions shown in this film were too simple. If large scale farming was practiced in the underdeveloped countries, millions of peasants would be faced with loss of land, jobs, and starvation. These countries do not have industry able to employee large numbers of people, and they do not now have the needed human skills or energy resources to create the industry. In addition, since many farmers cannot read and lack money to buy fertilizer and equipment, it is extremely difficult to really improve primitive farming techniques.

In a similar vein, in Columbia a cheap protein source might enable most of Emelio's siblings to reach adulthood. However, the farming technique of clearing an area, farm it for a few years, and then moving on cannot sustain a large population. We know of no other way to successfully farm in a jungle, since the heat and moisture quickly ruins any soil without dense plant cover. Thus, the new protein sources may only be laying the ground work for even more serious problems of feeding the growing population.

Bob Henderson will need to do much more than just exercise to take off weight. The film "Fat Fighters" indicates the psychological and social pressures which keep most fat people fat until they have damaged their bodies beyond easy repair.

Karen's problem is the only one of the four which can be treated easily. Most Americans can afford and select the appropriate foods if they have the knowledge and will to look for foods from the four food groups.

NUTRITION WORD GAMES

At least twenty-eight (you may find more) terms associated with nutrition can be found among these letters. They read forward, backward, up, down, or diagonally. Draw a line around each term as you find it; then list the term in the space provided on the side of this page. Seven of the hardest words in this list are: riboflavin, Kwashiorkor, digestion, palatability, metabolism, phosphorous, and amino acid.

A R I B O F L A V I N K I G P

C A R R I A G R I R U N T I D

A S O O K I E A T D B U T T I

R U N G D T R R A A B I T E C

B O P H I I I O D I N E S L A

O R A O C C A S I R O H O H O

H O L I K E N O S E L O N G N

Y H A E M S I L O B A T E M I

D P T V I T A M I N S A B D H

R S A I N H C O O K C A S H A

A O B T E I I U T C O P P E R

T H I S R A N I N N R C I C I

E P L T A H K P E U B A A L S

A N I O L I A B O T I L E E K

C I T E R H A F N M C O L I G

I G Y H D E C E O I A R I G E

T A S T E I I S U R C I H G T

O A S T B R G H I I I E A C H

R I F A T S O E G K D S A C P

S O B U R O N E S I H O G Y U

U N N C O L A A M T R O G E R

A P P L E O A C E H I C A E P

S E K W A S H I O R K O R G I

Y L T A C G P R O T E I N A L

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

16.

17.

18.

19.

20.

21.

22.

23.

24.

25.

26.

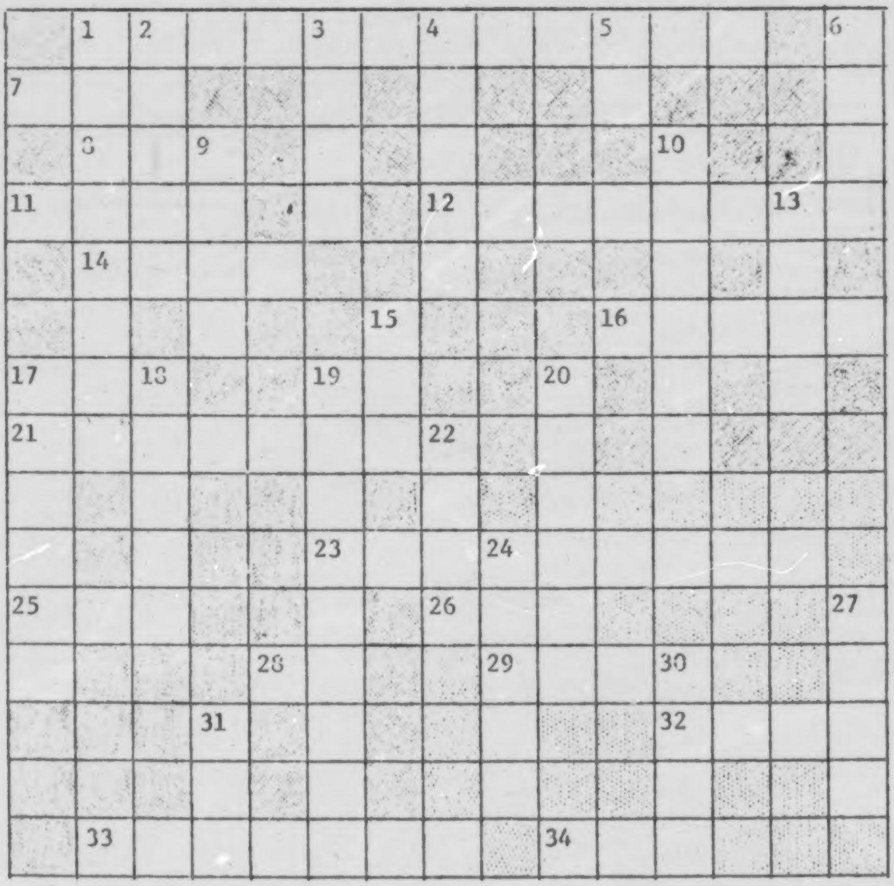
27.

28.

29.

30.

BEST COPY AVAILABLE


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34

DOWN

1. The units used to measure the energy contained in food.
2. Acids contained in proteins.
3. A common name for a substitute for butter.
4. Pregnant and __________ animals quickly show the results of poor nutrition.
5. Nutritious meals are most important during this half of the day.
6. Food group containing iron.

ACROSS

1. A nutrient supplying quick energy.
7. Prepared from a pig's back half.
8. Every cookie jar needs one.
11. Nutritional value of coffee.
12. Any chemical in food which could help the body is called a ______.
14. Sounds of an empty stomach.
16. Vegetables with high levels of protein and iron.

Down (Continued)

9. When eaten, most food is __________.

10. To break food into small molecules.

13. How many extra servings of cereal or bread should a lady eat each day when pregnant?

15. A nutrient containing large amounts of energy.

17. This color indicates that Vitamin A is in a vegetable.

18. A food with a good mixture of amino acids, iron, fat, and the B vitamins.

19. An adjective used to describe food which is edible.

20. A food with high levels of protein and calcium.

22. A nutritious food in the meat group.

24. The single most nutritious meat.

27. A common drink with high nutritional value.

30. A mineral which helps carry oxygen throughout the body.

31. This is an abbreviation for the most common and essential chemical compound in your body. It is found in all natural foods.

Across (Continued)

17. A word which dieters should try not to use.

19. Abbreviation for Pennsylvania.

21. Most people use this method to measure the nutritional value of a meal.

23. The best cake for a dieter to "sample."

25. A common tree with an edible seed.

26. A female relative.

28. Abbreviation for a mineral which helps blood clot, muscles react, and bone support.

29. Add these letters to "son" and you get the meat from a wild animal.

32. A name for the shape used by the body to store excess energy around the waste.

33. A nutrient which is difficult to obtain for most people throughout the world.

34. A cheap source of Vitamin D.

TOPICS AND CONCEPTS

4) Students should be able to match the correct food group with a set of its four most important nutrients.

5) Students should be able to select the set of three foods which can best supply good quantities of iron.

6) Students should indicate that fats and carbohydrates supply most of a person's energy.

7) Students should indicate that vitamins and minerals are primarily used in assisting cellular activities in the body.

8) Students should indicate that, during pregnancy, the mother needs to eat slightly more from the fruit and fresh vegetable, milk, and meat groups.

10) Students will indicate that water is essential for every chemical process in the body.

13) Students should be able to select the food best able to provide good quantities of all amino acids.

14) Students should be able to select the nutrient in shortest supply throughout the world.

SUGGESTIONS FOR PRESENTATION OF PAPER D

These two games are designed to re-emphasize some of the basic words which are new to most students. No new objectives are introduced in these games, so this paper may be used as an optional assignment if desired.

Pages D-1 and D-2 may be duplicated for students. Transparencies 2 and 3 in the back of this book contain the correct answers.

Food Values of Commonly Eaten Foods

The tables following this page list the food values for average servings for many kinds of food. The food values are listed in percentages, so that you can easily see the quality of each food. The tables are based on daily dietary needs for average teenage girls, ages 14-16. Girls need about the same levels of nutrients as boys, but fewer calories. This means girls must choose their foods more carefully than boys and that more girls will be overweight or undernourished. Girls 16-18 need about the same nutrients, but fewer calories, so they have an even harder time choosing nutritious low calorie foods. Males need more calories, protein, and B vitamins than girls of the same age, and people of different ages have different requirements. The nutrient requirements for average sized people of many ages are shown in Table 1.

1) How well do these two diets supply the daily needs for calories and each nutrient for a fifteen year old girl? Figure out the total percentage of the daily needs supplied by each day's diet using two of the food value charts.

Diet 1	Diet 2
Breakfast Orange Juice, Toast and Jelly, Coffee	Breakfast Orange Juice, Poached Egg on Toast, Milk
Lunch Baked Beans, Bread and Butter, Apple Pie, Coke	Lunch Baked Beans, Coleslaw, Bread and Butter, Milk, Banana
Dinner Pork Chop, Sweet Potato, Green Beans, Bread and Butter, Frosted Layer Cake, Tea	Dinner Pork Chop, Sweet Potato, Green Beans, Tossed Salad, Ice Cream, Milk

2) Chart the meals and snacks you ate yesterday as closely as you can. If a food you ate is not in the tables, choose one as much like it as possible to estimate your food's nutrient content. Be sure to increase or decrease the nutrients if you ate more, or less, of the food than is listed on the chart.

3) Pick out low calorie foods from each food group. Use them to develop a nutritious diet for one day for a fifteen year old boy who is trying to lose weight. Check your diet by adding it up on one of the food value charts.

4) Pick out a good diet for a fifteen year old girl that is anemic and needs more iron and protein, but no more calories than normal. Check your diet on a food value chart.

5) Which one of the vegetables (page 9) could be classified into the meat group because of its nutrients?

6) Why are the soups found in three different places in this chart?

BEST COPY AVAILABLE

TABLE 1 RECOMMENDED DAILY DIETARY ALLOWANCES

Persons	Age	Weight In Pounds	Height In Inches	Calories	Nutrient Values Expressed as Percentage of Recommended Allowance for 14-16 Year Old Girls								
					Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Children	1-2	26	32	1,100	46	45	54	84	40	50	43	50	80
	2-3	31	36	1,250	52	45	61	84	40	59	50	50	80
	3-4	35	39	1,400	58	55	61	56	50	58	57	56	80
	4-6	42	43	1,600	67	55	61	56	50	67	64	69	80
	6-8	51	48	2,000	83	64	69	56	70	83	78	81	80
	8-10	62	52	2,200	92	73	77	56	70	91	85	94	80
Males	10-12	77	55	2,500	104	82	92	56	90	103	93	106	80
	12-14	95	59	2,700	112	91	107	100	100	116	100	112	90
	14-18	130	67	3,000	125	109	61	100	100	125	107	125	110
	18-22	147	69	2,800	117	109	61	56	100	116	114	112	120
	22-35	154	69	2,800	117	118	61	56	100	116	121	112	120
	35-55	154	68	2,600	108	118	61	56	100	108	121	106	120
	55-75+	154	67	2,400	100	118	61	56	100	100	121	87	120
Females	10-12	77	56	2,250	94	91	92	100	90	91	93	94	80
	12-14	97	61	2,300	96	91	100	100	100	100	100	94	90
	14-16	114	62	2,400	100	100	100	100	100	100	100	100	100
	16-18	119	63	2,300	96	100	100	100	100	100	107	94	100
	18-22	128	64	2,000	83	100	61	100	100	83	107	81	110
	22-35	128	64	2,000	83	100	61	100	100	83	107	81	110
	35-55	128	63	1,850	77	100	61	56	100	83	107	81	110
	55-75	128	62	1,700	71	100	61	100	100	83	107	81	110
Pregnant				+200	+8%	118	+30%	100	120	+8	123	100	120
Lactating			+	1,000	+41%	136	+38%	100	160	+41%	142%	125%	120

BEST COPY AVAILABLE

TABLE 2 FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE MILK GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Drinks										
1. Buttermilk (cultured) or skim milk - 1 glass, ½ pint	90	4	16	23	1	0	3	31	14	4
2. Chocolate dairy drink--made of skim milk - 1 glass, ½ pint	190	8	14	21	3	4	8	29	14	5
3. Chocolate milk--made of whole milk, flavored - 1 glass, ½ pint	215	9	16	22	3	6	7	29	14	5
4. Milk, whole pasteurized 1 glass, ½ pint	160	7	16	22	1	7	7	30	14	4
5. Milkshake (1 cup milk, ½ cup ice cream, 2T. choc. syrup)	405	17	22	30	4	14	9	41	20	6
Main Dishes										
6. Cheese, Cheddar process, 1-oz. slice or cube	105	4	13	17	2	7	0	9	9	0
7. Cottage cheese, creamed (4% fat) ½ cup	120	5	28	9	2	4	3	20	22	0
8. Cottage cheese, uncreamed ½ cup	100	4	35	8	3	0	3	23	22	0
9. Macaroni and cheese, enriched macaroni, 3/4 cup	350	15	24	23	8	14	14	24	33	0
10. Soups: cream of potato (prepared with equal volume of milk) - 1 cup	185	8	14	16	6	12	8	19	3	--
11. Soups: (prepared with equal volume milk) cream of chicken - 1 cup	180	8	13	13	3	12	4	19	4	4
12. Soups: (prepared with equal volume milk) cream of mushroom - 1 cup	215	9	13	15	3	5	4	24	4	2
13. Soups: (prepared with equal volume milk) tomato - 1 cup	175	7	13	13	4	24	8	18	8	30
14. Spaghetti in tomato sauce with cheese, home recipe 1 cup	260	11	16	6	13	22	21	13	14	26
15. Yoghurt, using partially skimmed milk - 1 cup	125	5	14	23	1	3	8	31	1	4
16. Yoghurt, whole milk - 1 cup	150	6	12	21	1	7	6	28	1	4

BEST COPY AVAILABLE

TABLE 2
(Continued) FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE MILK GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Desserts										
17. Baked custard, ½ cup	145	6	12	11	3	9	4	17	13	1
18. Ice cream, vanilla - 1 cup	290	12	12	14	2	14	4	18	10	4
19. Ice milk, hardened - 1 cup	200	8	11	16	1	6	6	21	1	2
20. Ice milk, soft - 1 cup	265	11	14	21	1	7	3	28	1	4
21. Pudding, home recipe with starch base, choc. - 1 cup	385	16	14	19	7	8	4	26	2	2
22. Tapioca dessert: cream pudding - 1 cup	220	9	14	13	4	10	6	21	1	4
Miscellaneous										
23. Butter, regular - 1 pat	35	2	-	-	-	3	-	-	-	-
24. Butter, whipped - 1 pat	25	1	-	-	-	3	-	-	-	-
25. Cream, light, table, ¼ cup	125	5	3	5	0	10	2	6	3	1
26. Margarine, regular - 1 pat	35	2	-	-	-	3	-	-	-	-
27. Salad dressing, blue cheese - 1 T.	75	3	2	1	-	1	-	1	-	-

BEST COPY AVAILABLE

TABLE 3 FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE MEAT GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Beef										
1. Beef, dried or chipped 2 ounces	115	5	34	1	16	-	3	13	14	-
2. Corned beef, canned 3 ounces	185	8	40	1	21	-	1	14	18	-
3. Hamburger, 3 oz. & bun	360	15	44	3	19	1	15	18	54	0
4. Liver, beef, fried, 3 ounces	195	8	41	1	42	908	19	254	114	45
5. Meat patties, ground beef 3 ounces, cooked	245	10	38	1	15	1	6	13	45	0
6. Roast, relatively fat lean and fat - 3 ounces	375	16	31	1	12	1	4	9	19	-
7. Roast, relatively fat lean only - 1.8 ounces	125	5	25	1	10	-	3	8	16	-
8. Roast, relatively lean, lean and fat - 3 ounces	165	7	46	1	18	-	5	14	28	-
9. Roast, relatively lean, lean only - 2.7 ounces	125	5	43	1	17	-	5	13	27	-
10. Steak, broiled, relatively fat, lean and fat - 3 ozs.	330	14	36	1	14	1	4	11	25	-
11. Steak, broiled, relatively fat lean only - 2 ounces	115	5	33	1	12	-	4	10	22	-
12. Steak, broiled, relatively lean, lean and fat - 3 ozs.	220	9	44	1	17	-	6	14	30	-
13. Steak, broiled, relatively lean, lean only - 2.4 ozs.	130	5	38	1	14	-	5	11	26	-
Pork										
1. Bacon, broiled, crisp, 2 long slices	150	6	14	0	4	0	10	6	10	0
2. Chitterlings, [illegible] and fried, 2 ounces	120	5	20	-	[illegible]	-	25	10	[illegible]	-
3. Frankfurter, 1 4/5 oz. and bun	270	11	17	2	8	[illegible]	16	12	23	[illegible]
4. Ham, lean and fat, roasted 3 ounces	245	10	33	1	12	-	33	11	19	-
5. Luncheon meat: canned, spiced or unspiced - 2 ozs.	165	7	15	-	7	-	15	9	10	-
6. Pork chop, cooked, with bone - 3½ oz.	260	11	29	1	12	0	52	13	46	0
7. Salami, dry type - 1 ounce	130	5	13	-	5	-	3	5	9	-

BEST COPY AVAILABLE

TABLE 3
(Continued) FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE MEAT GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Pork (Continued)										
8. Sausage: Bologna, slice 3-inch diameter by 1/8 inch - 2 slices	80	3	5	-	3	-	3	4	4	-
9. Shoulder steak or roast, lean and fat - 2.3 ounces	260	11	29	1	12	-	52	13	24	-
10. Shoulder steak or roast, lean only 1.7 ounces	130	5	27	1	11	-	45	11	21	-
11. Vienna sausage, canned 1 sausage	40	2	4	-	2	-	1	1	2	-
Chicken										
1. Chicken, broiled, without bone - 3 oz.	115	5	36	1	8	2	4	11	68	0
2. Chicken, ½ breast, fried, with bone - 3.3 oz.	155	6	45	1	7	1	3	12	70	-
3. Chicken, drumstick, fried, with bone - 2.1 oz.	90	4	22	1	5	1	2	11	17	-
4. Chicken, canned, boneless 3 oz.	170	7	33	1	7	4	2	8	23	6
5. Egg, 1, poached, soft or hard cooked	80	3	12	2	6	12	4	10	-	0
6. Eggs, white of egg - 1 white	15	-	7	-	-	-	-	6	-	-
7. Eggs, Yoke of Egg - 1 Yoke	65	3	5	2	6	12	4	4	-	-
8. Eggs, Scrambled with milk and fat - 1 egg	110	5	13	4	6	14	4	13	-	-
Lamb										
1. Lamb chop, thick, with bone, broiled, lean and fat 4 oz.	400	17	45	1	3	-	12	13	35	-
2. Lamb chop, thick, with bone, broiled, lean only - 2.6 oz.	140	6	38	1	8	-	9	14	28	-
3. Lamb leg, roasted, lean and fat - 3 oz.	235	10	40	1	8	-	11	16	29	-
4. Lamb leg, roasted, lean only - 2.5 oz.	130	5	36	1	8	-	10	15	28	-

BEST COPY AVAILABLE

TABLE 3
(Continued) FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE MEAT GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Sea Food										
1. Clams: Canned, solids and liquid - 3 oz.	45	2	13	2	19	-	1	6	6	-
2. Fish, bluefish, baked with table fat - 3 oz.	135	6	40	2	3	1	8	6	10	-
3. Fish, fried haddock - 3 oz.	140	6	31	2	6	0	2	4	33	4
4. Fish sticks, breaded, cooked, frozen - 5 sticks 4 oz.	200	8	34	1	2	-	4	6	11	-
5. Ocean perch, breaded, fried 3 oz.	195	8	29	2	6	-	6	6	9	-
6. Tuna, canned in oil, drained solids - 3 oz.	170	7	44	1	9	1	3	7	63	-
High Protein Plant Food										
1. Beans, cooked, drained - 1 c.	225	9	27	7	28	-	22	9	3	-
2. Beans, lima, cooked, drained - 1 c.	260	11	29	4	33	-	21	8	8	-
3. Beans with frankfurters (sliced) - 1 c.	365	15	34	7	27	-	15	11	21	-
4. Baked beans, with pork and tomato sauce - 3/4 c.	240	10	22	8	20	5	12	4	17	8
5. Peanuts, roasted, salted, halves - ½ c.	420	18	34	4	8	-	19	7	77	-
6. Peanut butter sandwich, 2 slices enriched bread, 2 T. peanut butter, 2 t. butter	375	16	22	5	10	6	13	10	49	0
Mixed Main Dishes										
1. Beef and vegetable stew - 1 c.	210	9	27	2	16	47	11	12	28	30
2. Beef pot pie, baked, 1 pie 8 oz.	560	23	42	2	23	37	21	19	28	14
3. Burrito, large, home recipe	370	15	32	7	25	-	15	10	20	-
4. Chicken pot pie, 1 pie - 8 oz.	535	22	42	5	17	6	21	19	26	10
5. Chili con carne, canned, with beans - 1 c.	335	14	34	6	23	3	6	13	20	-

TABLE 3
(Continued) FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE MEAT GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Mixed Main Dishes (Continued)										
6. Pizza, 1/8 of 14" pie 2½ oz.	185	8	13	8	4	6	3	9	4	8
7. Soups: prepared with equal volume water, bean with pork - 1 c.	170	7	14	5	13	13	2	6	6	6
8. Soups: prepared with equal volume water, beef noodle - 1 c.	70	3	7	1	6	1	4	5	6	-
9. Soups: prepared with equal volume water, cream of chicken - 1 c.	95	4	5	2	3	8	2	4	3	-
10. Soups: dehydrated, dry form, chicken noodle, 1 pkg	220	9	14	3	8	4	25	11	15	6
11. Spaghetti with meatballs and tomato sauce, home recipe - 1 c.	330	14	34	10	21	32	21	21	25	44
12. Taco, home recipe, 1 oz. hamburger, ½ oz. cheese, lettuce, & tomatoes	176	7	19	6	9	22	7	10	21	15

BEST COPY AVAILABLE

TABLE 4

FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE FRUIT AND VEGETABLE GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Vegetables										
1. Asparagus - 4 spears	10	-	2	1	2	11	8	8	5	32
2. Beets - 1 cup	55	2	4	2	5	1	4	5	3	20
3. Broccoli - 1 cup	40	2	9	10	7	78	12	22	8	280
4. Cabbage - 1 cup	20	1	2	3	2	2	4	4	2	84
5. Carrots - 1 carrot, raw	20	1	2	1	2	110	2	2	2	8
6. Carrots, cooked, diced 1 c.	45	2	2	4	5	304	6	5	4	18
7. Cauliflower - 1 cup	25	1	5	2	4	1	9	7	4	132
8. Celery, raw - 1 large stalk	5	-	-	1	1	2	1	1	1	8
9. Coleslaw - ½ cup	60	2	1	2	1	2	2	2	2	35
10. Corn, sweet, canned, solids and liquid - 1 c.	170	7	9	1	6	14	6	9	14	26
11. Cucumbers, raw, pared - 1 cucumber	30	1	2	3	3	-	6	6	2	46
12. French fries, 10 pieces, 2x½x½ - 2 oz.	155	6	4	1	4	0	6	3	12	24
13. Green beans, cooked - ½ c.	15	1	2	2	2	7	3	4	3	16
14. Lettuce, raw - 1 head	60	2	7	7	13	30	24	19	8	58
15. Mushrooms, canned, solids and liquid - 1 cup	40	2	9	1	7	-	3	43	30	8
16. Olives, green pickled, 4 medium or 3 extra large or 2 giant	15	-	-	1	1	1	-	-	-	-
17. Onions, mature - 1 onion	40	2	4	2	3	1	3	3	1	22
18. Peas, green, canned, solids and liquid - 1 c.	165	8	16	4	23	22	19	9	14	44
19. Pickles, cucumber: dill, medium, whole, 3 3/4-inch long, 1 ¼-inch diameter - 1 pickle	10	-	2	1	4	1	-	1	-	8
20. Pickles, cucumber: sweet, gherkin, small, whole 2 ½-inch long, 3/4-inch diameter - 1 pickle	20	-	-	-	1	-	-	-	-	2
21. Pickles, cucumber: relish, finely chopped, sweet - 1 T.	20	-	-	-	1	-	-	-	-	-
22. Potatoes, medium: baked, peeled after baking - 1 potato	90	4	5	1	4	-	8	3	11	40
23. Potatoes, boiled. peeled before boiling - 1 potato	80	3	4	1	3	-	9	3	9	40
24. Potatoes, mashed: milk and butter added - 1 cup	185	8	7	4	4	7	13	7	12	36

BEST COPY AVAILABLE

TABLE 4 (Continued)

FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE FRUIT AND VEGETABLE GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Vegetables (Continued)										
25. Potato chips, 10 chips, 2 3/4 oz.	115	5	2	1	2	0	3	1	7	6
26. Radishes, raw, small, without tops - 4 radishes	5	-	-	1	2	-	1	1	1	20
27. Squash, cooked, winter, baked - 1 cup	130	5	7	4	9	172	8	19	9	54
28. Sweet potato, 1 medium, cooked - 5 oz.	170	7	4	4	6	232	11	6	10	50
29. Tomato, 1 medium, 2x2½"	40	2	4	2	4	27	8	4	5	68
30. Tomato catsup, 1 T.	15	-	-	-	1	4	1	1	1	4
31. Tomato juice, canned - 1 c.	45	2	4	1	12	39	10	5	12	78
32. Turnips, cooked, diced - 1 cup	35	2	2	4	3	-	5	6	3	63
Fruits										
1. Apple, 1 medium	70	3	0	1	2	1	3	1	1	6
2. Apple juice, bottled or canned - 1 cup	120	5	-	1	8	-	2	4	1	4
3. Applesauce, canned, sweetened - 1 cup	230	10	2	1	7	2	4	2	1	6
4. Apricots, canned in heavy syrup - 1 cup	220	9	4	2	4	90	4	4	6	6
5. Banana, 1 medium	85	4	2	1	4	4	4	4	7	20
6. Cantaloupe, raw, medium 5-inch diameter, about 1 2/3 lbs. - ½ melon	60	2	2	2	4	131	6	4	7	126
7. Cherries, canned, red, sour, pitted, water pack - 1 c.	105	4	4	3	4	33	6	4	3	24
8. Cranberry juice cocktail, canned - 1 cup	165	7	-	1	4	-	2	2	8	80
9. Fruit cocktail, canned, in heavy syrup - 1 cup	195	8	2	2	5	7	4	2	8	10
10. Grapefruit, raw, medium pink or red - ½ grapefruit	50	2	2	2	3	11	4	1	1	88
11. Grapefruit, canned, syrup pack - 1 cup	180	8	4	3	4	1	6	4	3	152
12. Grapefruit juice, sweetened 1 cup	130	5	2	2	5	-	6	3	2	156
13. Grapes, raw: American type (slip skin) - 1 cup	65	3	2	1	2	2	4	2	1	6

BEST COPY AVAILABLE

TABLE 4
(Continued)

FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE FRUIT AND VEGETABLE GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Fruits (Continued)										
14. Grape juice, canned or bottled - 1 cup	165	7	2	2	4	-	8	4	3	-
15. Lemonade concentrate, diluted with 4 1/3 parts water, by volume - 1 c.	110	5	-	-	-	-	-	1	1	34
16. Oranges, raw, 2 5/8-inch diameter, all commercial varieties - 1 orange	65	3	2	4	3	5	11	4	3	132
17. Orange and Grapefruit juice 1 cup	110	5	2	2	1	5	13	1	5	204
18. Peaches, raw, whole, medium, 2-inch diameter, about 4 per pound - 1 peach	35	1	2	1	3	26	2	4	6	14
19. Peaches, canned, yellow-fleshed, solids and liquid, syrup pack heavy, halves or slices - 1 cup	200	8	2	1	4	22	2	4	9	14
20. Peaches, frozen, carton, 12 oz, not thawed - 1 carton	300	12	2	1	9	44	2	10	15	270
21. Pears, raw, 3x2½-inch diameter - 1 pear	100	4	2	1	3	1	3	5	1	14
22. Pears, canned, solids, and liquid, syrup pack, heavy, halves or slices - 1 cup	195	8	2	1	3	-	2	4	2	8
23. Pineapple, raw, diced - 1 c.	75	3	2	2	4	2	10	3	2	48
24. Pineapple, sliced, slices & juice - 2 small or 1 large	90	4	-	1	2	1	8	2	1	16
25. Plums, all except prunes, raw, 2-inch diameter, about 2 ounces - 1 plum	25	1	-	1	2	3	2	1	2	6
26. Plums (with pits) and juice - 1 cup	205	8	2	2	12	60	4	4	6	8
27. Prunes, dried, softenized, medium, uncooked - 4 prunes	70	3	2	1	6	9	2	3	2	2
28. Prune juice, canned or bottled - 1 cup	200	8	2	3	6	-	2	2	6	10
29. Raisins, seedless, packaged, ½ oz. or 1½ T. per package - 1 package	40	2	-	1	3	-	2	1	1	-
30. Strawberries, frozen, 10 oz. carton, not thawed - 1 carton	310	13	2	3	11	2	5	12	9	300

BEST COPY AVAILABLE

TABLE 4
(Continued)

FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN THE FRUIT AND VEGETABLE GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Fruits (Continued)										
31. Watermelon, raw, wedge, 4 x 8 inches (1/16 of 10 x 16 inch melon, about 2 lbs. with rind) - 1 wedge	115	5	4	2	12	50	11	9	4	60
32. Yeast, baker's dry, active 1 package	20	–	5	–	6	–	16	27	16	–
Mixed Dishes										
1. Fruit salad, fresh apple, orange, grapefruit, ½ cup, 2 leaves lettuce	50	2	2	2	2	2	4	1	1	66
2. Sherbet - 1 cup	260	11	4	2	–	2	2	4	–	8
3. Soups: prepared with equal volume water, cream of mushroom - 1 c.	135	6	4	3	3	1	2	9	4	–
4. Soups: prepared with equal volume water, tomato - 1 cup	90	4	4	1	4	20	4	4	8	24
5. Soups: prepared with equal volume water, vegetarian - 1 cup	80	3	4	2	6	60	4	4	6	–
6. Tossed green salad, greens, carrot, radishes 3/4 cup	30	1	3	3	6	62	8	7	5	38

TABLE 5 FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN BREAD, CEREAL, AND MISCELLANEOUS GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Cereals										
1. Bran flakes (40% Bran) added thiamin and iron - 1 cup	105	4	7	2	7	-	12	4	14	-
2. Bran flakes with raisins, added thiamin and iron - 1 cup	145	6	7	2	8	-	13	5	17	-
3. Bulgur, canned, seasoned - 1 cup	245	10	14	2	11	-	6	4	26	-
4. Corn, puffed, presweetened added nutrients - 1 cup	115	5	2	-	3	-	11	4	4	-
5. Cornflakes, added nutrients sugar-covered - 1 cup	155	6	4	-	2	-	13	1	5	-
6. Hominy grits, de-germed cooked, enriched - 1 cup	125	5	5	-	4	3	8	5	6	-
7. Oatmeal or rolled oats, cooked - 1 cup	130	5	9	2	8	-	16	4	1	-
8. Oatmeal, whole grain - 3/4 cup	100	4	7	2	5	0	12	3	8	0
9. Popcorn, popped with oil and salt - 1 cup	40	2	2	-	1	-	-	1	1	-
10. Rice, white, instant, ready-to-serve - 1 cup	180	8	7	-	7	-	18	-	11	-
11. Rice, puffed, added nutrients - 1 cup	60	2	2	-	2	-	6	1	4	-
12. Wheat, puffed, added nutrients - 1 cup	55	2	4	-	3	-	6	2	8	-
13. Wheat flakes, added nutrients - 1 cup	105	4	5	1	7	-	16	3	9	-
Breads										
1. Bagel, 3-inch diameter, egg - 1 bagel	165	7	11	1	7	1	12	7	8	-
2. Biscuits, baking powder from home recipe with enriched flour, 2-inch diameter - 1 biscuit	105	4	4	3	2	-	5	4	1	-
3. Breads White bread, enriched - 1 slice	70	3	4	2	3	-	5	4	4	-
4. Bread, enriched, + 1 pat of butter - 1 slice	110	4	4	2	3	5	5	4	4	0
5. Breads: Whole-wheat bread 1 slice	65	3	5	2	4	-	8	2	5	-

BEST COPY AVAILABLE

TABLE 5
(Continued)

FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN BREAD, CEREAL, AND MISCELLANEOUS GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Breads (Continued)										
6. Breads: cracked-wheat bread - 1 slice	65	3	4	2	2	-	2	1	2	-
7. Breads: French or Vienna bread, enriched, 1-pound loaf - 1 loaf	1315	55	74	115	55	-	108	72	71	-
8. Breads: raisin bread - 1 slice	65	3	4	1	2	-	1	1	1	-
9. Breads: rye bread - 1 slice	60	2	4	1	2	-	4	1	2	-
10. Corn muffins, made with mix, egg, and milk, muffin 2 3/8-inch diameter - 1 muffin	130	5	5	7	3	2	6	6	4	-
11. Crackers, graham, 2½-inch square - 4 crackers	110	5	4	1	2	-	1	4	2	-
12. Crackers, saltines, 4 crackers	50	2	2	-	1	-	-	-	1	-
13. Doughnuts, cake type - 1 doughnut	125	5	2	1	2	1	4	4	2	-
14. Macaroni, cooked, enriched 1 cup	155	6	9	1	7	-	17	8	9	-
15. Pancakes, plain or buttermilk (made with egg and milk) - 1 cake	60	2	4	4	2	1	3	4	1	-
16. Pretzels, thin, twisted - 1 pretzel	25	1	2	-	1	-	-	-	-	-
17. Rolls, enriched, frankfurter or hamburger - 1 roll	120	5	5	2	4	-	9	5	6	-
18. Spaghetti, cooked until tender, enriched - 1 cup	155	6	9	1	7	-	17	8	9	-
19. Waffles with enriched flour, 7-inch diameter - 1 waffle	210	9	13	7	7	5	11	14	6	-
Desserts										
1. Cakes: Angelfood, 1/12 of a 10-inch diameter cake - 1 piece	135	6	5	4	1	-	-	4	1	-
2. Cakes: cupcakes, small, 2½ inch diameter, with chocolate icing - 1 cupcake	130	5	4	4	2	1	1	3	1	-

BEST COPY AVAILABLE

TABLE 5
(Continued)

FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN BREAD, CEREAL, AND MISCELLANEOUS GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Desserts (Continued)										
3. Cakes: Gingerbread, 1/9 of 8-inch square cake - 1 piece	175	7	4	4	6	-	2	4	3	-
4. Cakes: White, 1/16 of 9-inch diameter cake - 1 piece	250	10	5	5	2	1	1	4	1	-
5. Cakes: Boston cream pie, 1/12 of 8-inch diameter cake - 1 piece	210	9	7	4	2	3	2	6	1	-
6. Cakes: Pound ½-inch thick slice	140	6	4	-	1	2	1	2	1	-
7. Cakes: Sponge, 1/12 of 10-inch diameter cake - 1 piece	195	8	9	2	4	6	2	6	1	-
8. Cakes: Yellow, 2-layer, icing, 1/16 of 9-inch diameter cake - 1 piece	275	11	5	4	3	2	2	4	1	-
9. Cookies: Brownies with nuts 1 brownie	95	4	2	1	2	1	3	1	1	-
10. Cookies: Chocolate chip - 1 cookie	50	2	2	-	1	-	1	1	1	-
11. Cookies. Fig bars - 1 cookie	50	2	2	1	1	-	-	1	1	-
12. Cookies: Sandwich, choc. or vanilla - 1 cookie	50	2	2	-	1	-	-	-	1	-
13. Gelatin dessert, prepared with water, 1 cup	140	6	7	-	-	-	-	-	-	-
14. Pie: Apple, 1/6 of 9-inch pie - 1 piece	400	16	7	1	2	1	2	1	1	2
15. Pie. Butterscotch (1 crust) 1/6 of 9-inch diameter pie - 1 piece	410	18	13	9	8	8	4	11	2	-
16. Pie: Cherry (2 crust), 1/6 of 9-inch diameter pie - 1 piece	410	18	8	1	2	14	2	2	5	-
17. Pie: Custard (1 crust), 1/6 of 9-inch diameter pie - 1 piece	332	14	16	12	5	7	7	18	2	-
18. Pie: Lemon Meringue, 1/6 of 9-inch diameter pie - 1 piece	355	14	8	1	4	5	4	8	1	9
19. Pie: Mince (2 crust), 1/6 of 9-inch diameter pie - 1 piece	430	18	6	4	9	-	9	5	4	2

BEST COPY AVAILABLE

TABLE 5
(Continued)

FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN BREAD, CEREAL, AND MISCELLANEOUS GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Desserts (Continued)										
20. Pie: Pecan (1 crust), 1/6 of 9-inch diameter pie - 1 piece	575	28	13	5	21	5	18	7	2	-
21. Pie: Pumpkin (1 crust), 1/6 of 9-inch diameter pie - 1 piece	320	14	11	6	5	75	4	11	5	-
22. Sweet roll, 2 oz. - 1 roll	180	8	10	4	2	1	3	6	9	0
Beverages										
1. Alcoholic: gin, rum, vodka, whisky, 86 proof - 1½ fluid ounces	105	4	-	-	-	-	-	-	-	-
2. Beer (3.2), 12 fl. ounces	150	6	2	1	-	-	1	8	14	-
3. Coffee, with 2 T. cream and 2 t. sugar - 1 cup	90	3	0	2	0	5	0	3	0	0
4. Ginger ale - 12 fl. ounces	115	5	-	-	-	-	-	-	-	-
5. Root beer - 12 fl. ounces	150	6	-	-	-	-	-	-	-	-
6. Soft drink, carbonated, cola type - 8 fl. ounces	95	4	0	0	0	0	0	0	0	0
7. Table wine - 3½ fl. ounces	85	4	-	1	2	-	-	1	1	-
Salad Dressings										
1. Salad Dressings: French, regular - 1 T.	65	3	-	-	1	-	-	-	-	-
2. Salad Dressings: French, with special dietary, low fat with artificial sweetners - 1 T.	-	-	-	-	1	-	-	-	-	-
3. Salad Dressings: mayonaise type, regular - 1 T.	65	3	-	-	-	1	-	-	-	-
4. Salad Dressings: mayonaise type, special dietary - 1 T.	20	-	-	-	-	1	-	-	-	-
5. Salad Dressings: Thousand Island - 1 T.	80	3	-	-	1	1	-	-	-	-
Candies, Syrups, and Sweets										
1. Candy: Caramels, plain or chocolate - 1 ounce	115	5	2	3	2	-	1	4	1	-

BEST COPY AVAILABLE

TABLE 5 (Continued) FOOD VALUES OF AVERAGE SERVINGS OF COMMON FOODS IN BREAD, CEREAL, AND MISCELLANEOUS GROUP

Food, Approximate Measure, and Weight	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
Candies, Syrups, and Sweets (Continued)										
2. Candy: Chocolate-coated peanuts - 1 ounce	160	7	9	3	2	-	8	4	13	-
3. Candy: Fudge, plain - 1 oz.	115	5	2	2	2	-	1	2	1	-
4. Candy: hard - 1 ounce	110	5	-	-	3	-	-	-	-	-
5. Honey, strained or extracted - 1 T.	65	3	-	-	1	-	-	1	1	-
6. Jelly - 1 T.	55	2	0	0	2	0	0	1	0	2
7. Molasses, cane, light (First extraction) - 1 T.	50	2	-	3	5	-	1	1	-	-
8. Syrup, table blends, chiefly corn, light and dark - 1 T.	60	2	-	1	4	-	-	-	-	-
9. Sugar, white, granulated - 1 T.	40	2	-	-	-	-	-	-	-	-

BEST COPY AVAILABLE

DAILY FOOD CHART

Food Nutrient Values in Percentage

	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
DAILY TOTALS										

TOPICS AND CONCEPTS

4) Students should be able to match the correct food group with a set of its four most important nutrients.

5) Students should be able to select the set of three foods which can best supply good quantities of iron.

8) Students should indicate that, during pregnancy, the mother needs to eat slightly more from the fruit and fresh vegetable, milk, and meat groups.

9) From a set of four meals, students should be able to select a nutritionally balanced, inexpensive, and low calorie lunch.

12) Students should indicate that they are trying to keep their daily diets nutritionally balanced.

13) Students should be able to select the food best able to provide good quantities of all amino acids.

15) Students should indicate that a nutritionally balanced diet cannot be made from a single food source.

16) Students should be able to select the correct comparison of the fiber, protein, and mineral contents in two common foods.

SUGGESTIONS FOR PRESENTATION OF PAPER E

Duplicate four copies of Page E-18 for each student.

If class time is sufficient, work out the nutrient value of Diet 1 using transparency number 1 provided in the back of this manual. The nutrient values of the foods with page reference numbers are provided on the following page.

Have the students look up the foods by food group. This will enable them to: a) learn to classify foods according to food group, b) learn to classify food groups by their nutritional content, and c) move through the charts as efficiently as possible. When problems arise in interpretation (ie. what kind of bread was in the toast, was there butter on the toast, were the sweet potatoes cooked in brown sugar, etc.), use the opportunity to discuss the value of informed guesses. Let students volunteer a variety of solutions and take the best ones. Page numbers and food numbers are included after each food to help you locate the foods easily while the students are learning to use the charts. The numbers before the foods indicate the sequence in which they appear in the chart.

Students may ask the significance of "0" on some nutrients and "-" on others. "-" indicates a trace, but less than 1% of the nutrient in question. "0" indicates no measurable quantities of the nutrient.

If one or more simple adding machines can be provided for this activity, students would be able to quickly and accurately determine the totals for each food column.

BEST COPY AVAILABLE

Food	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Ribo-Flavin %	Niacin %	Ascorbic Acid
	Nutrient Values in Percentages									
5) Orange Juice (E-11, #17)	110	5	2	2	1	5	13	1	5	204
6) Toast (E-13, #3)	70	3	4	2	3	-	5	4	4	-
14) Jelly (E-17, #6)	55	2	0	0	2	0	0	1	0	2
11) Coffee (not included, no nutritional value without cream or sugar)	0	0	0	0	0	0	0	0	0	0
2) Baked Beans* (E-7, #3)	365	15	34	7	27	-	15	11	21	-
7) Bread & Butter (E-13, #4)	110	4	4	2	3	5	5	4	4	0
10) Apple Pie (E-15, #14)	400	16	7	1	2	1	2	1	1	2
12) Coke (E-16, #6)	95	4	0	0	0	0	0	0	0	0
1) Pork Chop (E-5, #6)	260	11	29	1	12	0	52	13	46	0
4) Sweet Potato (E-10, #28)	170	7	4	4	6	232	11	6	10	50
3) Green Beans (E-9, #13)	15	1	2	2	2	7	3	4	3	16
8) Bread & Butter (E-13, #4)	110	4	4	2	3	5	5	4	4	0
9) Frosted Layer Cake (E-15, #8)	275	11	5	4	3	2	2	4	1	-
13) Tea (not included, no nutritional value)	0	0	0	0	0	0	0	0	0	0
DAILY TOTALS	2035	83	95	27	64	257	113	53	99	274
*Had the students chosen baked beans with tomato sauce (E-7, #4), the total nutrients would have shifted by the indicated percentages.	-125	-5	-12	+1	-7	+5	-3	-7	-4	+8

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. How well do the two diets supply the daily needs for calories and nutrients for a fifteen-year-old girl?

A. Diet one will be quite low in calcium, iron, and riboflavin; somewhat low in calories, protein, and niacin; and more than adequate in Vitamins A and C. Vitamin A above 1000% will cause some problems with calcium removed from bones and birth defects if the very high level is maintained for weeks. The level in this diet will neither hurt nor help, but will maintain health. Excess Vitamin C will simply pass through the body. Continued low levels of calcium, iron, and riboflavin will cause a variety of short and long-term problems ranging from anemia and weakened bones to increased irritability and tiredness.

Diet two will do a much better job of balancing nutritional requirements, although it is still below par in supplying calories and iron. Ask the students what food would be ideal for a bedtime snack for this girl. The ideal answer would be peanut butter, lima beans, peas (found in the vegetable table), or beef of some sort, since she can use both calories and iron.

Use the two samples of baked beans shown on diet one chart to emphasize how the addition of tomato sauce and decreasing the quantity of beans can dramatically change the nutritional content of food. Thus, students must try to carefully determine both the ingredients and quantity of their food when evaluating their own diets.

Q 2. Chart the meals and snacks you ate yesterday as closely as you can.

A. Have one or two of your students provide their menus and total daily food values for the class. If an opaque projector is available, and if you have two students with good handwriting, it would be handy to examine their Daily Food Charts as a class and suggest substitute foods.

Q 3. Develop a nutritious, low calorie diet for an overweight 15-year-old boy.

A. See the suggestions for Question 2.

Q 4. Pick out a good diet for an anemic, protein deficient 15-year-old girl who has no need for extra calories.

A. See above suggestion.

Q 5. Which one of the vegetables (page 9) could be classified into the meat group because of its nutrients?

A. Peas - because of their high iron and protein levels. (They are classified with the vegetables because of their high Vitamin C content.) On the whole, peas are one of the most nutritional foods available to humans.

NOTE: You may wish to assign students the task of locating the best possible food so far as nutritional values versus calorie levels are concerned. Candidates for this honor could include macaroni and cheese (Page 3, #9); spaghetti in tomato sauce with cheese (Page 3, #14); beef liver (Page 5, #4); baked beans with pork and tomato sauce (Page 7, #4); spaghetti with meat balls and tomato sauce (Page 8, #11); and tacos (Page 8, #12).

Q 6. Why are the soups found in three different places in this chart?

A. Soups made with milk are high in calcium and protein, so they are classified in the milk group.

Soups made with water and a product from the meat group are higher in protein and iron, so they are classified in the meat group.

Soups made with vegetables as their main ingredient are classified in the vegetable group.

THERACON - HISTORY AND FUNCTION

In the first papers of this module, we studied human nutrition. Much of what is known about human nutrition has been learned as research laboratories, like Theracon, study animal nutritional requirements. Many of the techniques used at Theracon are used in human nutritional research. Many of the results of animal studies could help the future development of human foods.

History

The Theracon laboratory was founded in 1955 and is located just north of Topeka. It does contract research in animal nutrition. This means that if a pet food manufacturer, drug developer, or zoo has a problem with their food or drugs, they will specify the problem and ask groups like Theracon for help. Theracon will write a proposal on the research they would do to solve the problem. If their proposal is accepted, they will sign a contract, obtain the necessary animals and supplies, and begin doing the research needed to solve the problem.

Since they began doing research 17 years ago, Theracon has developed diets for many zoo animals, Sentry German Shepards, old dogs suffering from heart and kidney diseases cats, rats, horses, and many other kinds of animals. They also helped develop ways of sterilizing and preparing canned, semi-moist, dry, and liquid foods. You will see their laboratories and animals as part of your field trip.

Function

Animal Care

Theracon follows the principles of laboratory animal care developed by the National Society for Medical Research and supported by most organizations doing animal research They do blood analyses on their animals as they check an animal's health while eating a certain diet. No experimental surgery is performed at the laboratory, and veterinarians constantly watch the health of the animals. Sometimes when something new and untested is tried, an animal may develop symptoms of anemia, diarrhea, mineral deficiency, or other nutrition-based problems. This may cause particular animals pain or discomfort until the problem is corrected. The knowledge gained from working with those animals will help improve the health of many other animals.

Most animals are housed outdoors in insulated houses and have large areas to exercise. The spread of disease is kept to a minimum when animals remain outside, since the sun and wind destroy most germs. Bitches are housed inside when they are about to have pups and when caring for pups during the winter. Animals who are being used to determine exactly which nutrients are being used are housed inside so that their temperature and activity will be controlled, and all of their urine and feces can be collected.

Product Acceptability

Four main things are tested.

1) Is the diet acceptable to the animal? Will he eat it completely and readily? Will he choose it over another food? Does it soon tire of the food? This is measured by keeping accurate records of everything every animal eats, and comparing the animal's response to different foods.

2) Is the diet acceptable to the animal's owner? Theracon must develop diets which look and smell good to humans or many will not buy them. Does it cause diarrhea? This is tested by placing the animals in a pen with a concrete run [illegible] rating the hardness of the feces every day. Is the food mostly digestible, or will it cause large and numerous feces? Some pet foods are about 50 percent digestible, which means that half of what is eaten is simply passed right through the body. Eighty percent or more of a good food will digest. This means that only 20 percent will pass through the body.

3) Is the food economical and reliable? Theracon tries to develop alternative diets with quality that can be maintained using different ingredients. This allows the food manufacturers to switch the ingredients in the food as prices rise and fall and still produce a good food.

4) Is the diet nutritionally complete? Will the diet completely supply the necessary calories, proteins, minerals, vitamins, and drugs needed by the animals who will eat it? This problem, and the research methods used to test it, will be presented in the paper "Nutritional Analysis."

All of these factors are very important in producing an acceptable product. Even the most nutritious diet will fail if the animal's owner will not buy it because of odor, feces, or cost. On the other hand, if the animal won't eat it, or cannot stay healthy while eating the diet, the owner will not continue to purchase the product.

STUDENT SELF-TEST

1) How does a contract research company obtain its money?

2) Does Theracon use surgery to study animal nutrition?

3) What four main things must be studied before Theracon will approve a new diet?

4) Would every meal in your diet during the last three days meet all of Theracon's requirements? If not, where did it miss them?

TOPICS AND CONCEPTS

17) Students shall indicate that Theracon is an independent laboratory doing research under contract for other companies.

18) Students shall indicate that surgery is one technique not utilized in nutritional analysis at Theracon.

19) Students shall be able to select from a list the types of tests which Theracon uses to analyze a new diet.

20) Students shall indicate that Theracon keeps its animals outside to restrict the spread of diseases.

SUGGESTIONS FOR PRESENTATION OF PAPER F

Introduce this paper by pointing out that nutritional study on humans is quite difficult, since few of us will volunteer to stick to one diet long enough to give a good idea of our nutritional requirements. Much of the work on humans has been done on conscientious objectors during our various wars. These people were usually adult males. The best research can be done on pregnant females and young children, since they have a more critical need for good diets.

Most information on the effects of drugs and food utilization, mineral requirements, and other essential questions have come from animal nutrition studies such as those run at Theracon.

The booklets, "Feline Dietetics" and "Canine Dietetics," would provide teachers with excellent background reading for this and the next paper. These are furnished upon request to Topeka teachers and may be obtained free from Mark Morris Associates, 2900 Plass Court, Topeka, Kansas 66611.

Your students should not expect to see more than dogs and cats at Theracon. They will occasionally have more exotic animals; but this is the exception, not the rule.

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. How does a contract research company obtain its money?

A. By having their plan for researching a particular problem accepted by a company, signing a contract, and finding the needed answers through experimentation.

Q 2. Does Theracon use surgery to study animal nutrition?

A. No. Their veterinarians only take blood samples to check the animals' health. They do, of course, perform emergency surgery, such as a caesarean during difficult births.

Q 3. What four main things must be studied before Theracon will approve a new diet?

A. a) Will the animal eat it readily? - cats and monkeys cause special problems here, since they are quite finicky.

b) Will the owner use the food? - color, smell, and reaction of the animal to the food influences owners.

c) Is the diet economical and reliable? - can it be made cheaply and in quantity?

d) Is the diet nutritionally complete? - will animals remain healthy when they eat it?

Q 4. Would every meal in your diet during the last three days meet all of Theracon's requirements? If not, where did it miss them?

A. Bring out the four concepts above.

a) Acceptability to student - students usually claim to dislike school lunches though the lunches meet the other requirements.

b) Acceptability to owner (parent) - did they have a parent complain about what or how much was eaten?

c) Economical and reliable - did they eat expensive foods when other foods would have done just as well?

d) Nutritionally complete? - were all meals balanced?

BEST COPY AVAILABLE

NUTRITIONAL ANALYSIS

Every species of animal has different nutrient needs. There are, however, certain rules of nutrition which apply to all animals, regardless of their kind. These rules are:

1) The nutrients present in the food must be *usable* by the animal eating the diet.

2) The food must be *nutritious* enough to meet the needs of the animal.

3) The food must supply enough *calories* to meet the animal's daily energy requirements.

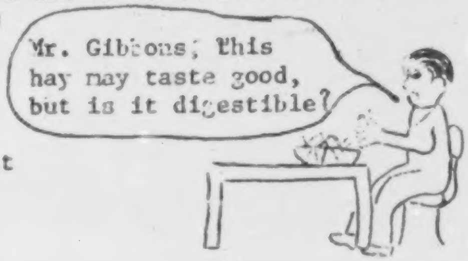
4) The food must be *acceptable* to the animal and its owner.

5) The ingredients used to make up the diet must be readily *available*, and the food value of the ingredients must remain *stable* after the diet is prepared for sale.

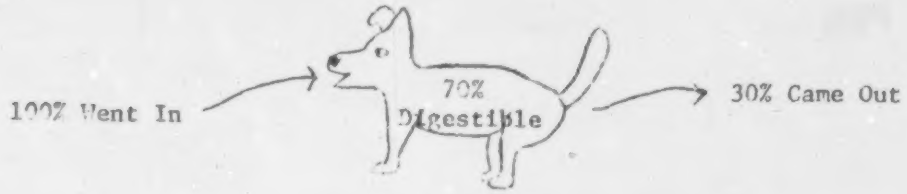
This paper will look at each of these principles and explain how they are tested and how they apply to animals and people.

Is The Food Usable?

To decide if a food is usable, Theracon must find out what an animal can digest. For instance, a perfect diet for a cow would starve a man to death because he could not digest it. This problem of digestibility exists whenever Theracon is asked to develop a diet for an animal, whether it is a dog, crocodile, ostrich, or eagle.


Mr. Gibbons, This hay may taste good, but is it digestible?

The first step in answering the problem is to consult research to see what other people have discovered about the animal. The second step is to carefully determine exactly what the animal is now eating--how much protein, carbohydrate, fat, fiber, etc. Then they carefully determine what is in the animal's feces. By comparing what went in and what came out, they know the digestibility of the food. The digestibility of fibers (the strings in celery, for instance) is very low for man. For cattle, it is high.



BEST COPY AVAILABLE

An interesting problem can arise at this point--just how much of the diet should be digested? For instance, a 100% digestible diet would cause damage to the underworked intestine. A 20% digestible diet would cause most animals to starve to death. A quality diet usually is about 80% digestible, although some commercial diets are about 50% digestible.

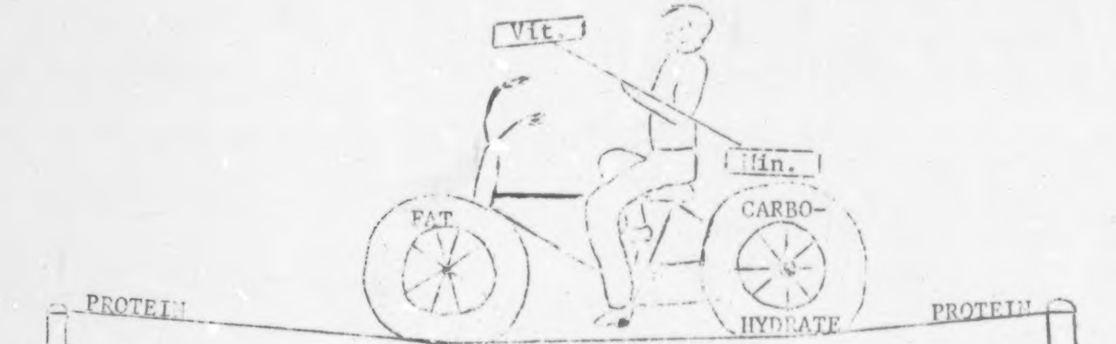
Is It Nutritious?

A nutritious diet will supply the animal or person with the proper balance of protein carbohydrate, fats, vitamins, and minerals. In determining if a food is nutritionall complete, Theracon feeds it to pregnant or growing animals. The young or pregnant animals will soon show ill health if an inadequate diet is supplied. Older animals would take a longer time to show bad health, so Theracon uses them for other types of diet research.

Proteins must be eaten in proper amounts for good development. Proteins are used by the body for growth and repair of all cells; production of hormones, enzymes, and antibodies; and for energy when needed. With too little protein, particularly in young and unborn babies, brain damage and stunted growth may occur.

Proteins are made of small pieces called amino acids. Animal proteins from milk, eggs, and meat contain all of the essential amino acids, although they may not be in just the right proportions. Plant proteins may lack several amino acids; however, plant proteins are inexpensive and are useful in the diet. A mixture of proteins from plants and animals is used to economically provide all of the amino acids needed by the body.

Excess protein can cause problems for dogs. This extra protein is used in the body to supply energy instead of being used as building blocks for cells. The excess protein is excreted from the kidneys as urea. Dogs which are kept on high protein diets for several years often develop kidney problems because of the difficulty of getting rid of this urea.



The Nutrition Balancing Act
If everything is right, you make it.

Fats and carbohydrates are used for energy. Low levels of fat and carbohydrate energ cause animals and humans to become listless, and the body begins burning proteins for energy. The levels of fats, carbohydrates, and proteins all work together to affect the animal. Low levels of energy or of protein during growth will cause smaller livers, kidneys, and hearts to form in young animals and humans. In Theracon's diets cereals, such as wheat, supply some of the energy. High protein plants, such as soybeans, supply some of the amino acids. With this balance, the animals can get the maximum use from the fat and protein contained in the expensive meat in their diets.

Theracon checks the amount of each food the animal digests, and the total amount of calories going in and coming out of the animal. They are then able to determine which nutrients are being used for energy by the many different kinds of animals for which they make diets. In addition, by observing the growing young, they are able to determine the correct levels and balance of proteins, carbohydrates, and fats.

Vitamins are essential for many different body functions. Different animals have different vitamin requirements. Usually animals and men eating a balanced diet do not need supplemental vitamins because they are present in their foods. Veterinarians more often treat cases where too many vitamins are causing problems rather than where a lack of vitamins is present. Vitamins A and D are the vitamins dogs and man more often have in excess. This excess usually causes health problems.

Minerals help regulate the body's chemical balances. They provide for tissue and bone development and help keep the body's enzyme systems functioning. The total amounts of different minerals must be in balance, because each mineral has a correct relationship to the others. If very high levels of iron, for instance, are in the diet, this may interfere with the body's ability to absorb copper, zinc, or calcium from its food. If too much, or too little, of any one mineral is available, the animal can get sick. This is really a problem with some of the all-meat diets, for they can be low in calcium and high on phosphorus. Dogs have starved to death eating all-meat foods even though they could eat all of the food desired. They simply could not get enough of the very essential calcium.

To determine an animal's vitamin and mineral requirements, Theracon would first consult research done by others on the animal. If questions still remain, Theracon creates "Scan," a diet made of very pure nutrients. This diet contains the right amounts of all known food requirements of the animal, with all other vitamins and minerals left out. They would then feed this diet to young or pregnant animals, and carefully observe their health. Blood tests would be run to determine the level of different minerals in the blood. If the animals do become sick, additional minerals and vitamins would be tested until the proper amounts of each nutrient were determined. By working in this manner, Theracon was able to devise a nutritious food which led to the hatching in captivity of the first bald eagle chicks in the United States. These chicks were born in the Topeka Zoo, where some of Theracon's research has been conducted.

Are Calories Important?

Theracon is concerned with the total calories in each diet. If too few calories are supplied, the animals will use up the protein for energy and their growth will be stunted. If too many calories are supplied, the animal will be overweight. Therefore, the number of calories digested from the food are carefully measured and the animal's weight is observed. Using this system, researchers have found, for instance, that a young pup needs 200 calories per pound of pup, a 10-week-old pup needs 125 calories per pound, and an adult dog needs about 80 calories per pound. Therefore, puppies must have high calorie foods with enough fat and carbohydrates to supply most of their energy. High levels of fat and carbohydrate energy allow the protein to be used for growth in the animal, not just for energy.

BEST COPY AVAILABLE

What If The Animal Doesn't Eat It?

Even with the best of efforts in providing a nutritious food, the food is no good if the animal won't eat it. This is particularly important with cats and monkeys, which are both finicky eaters. Therefore, Theracon tests each new diet by placing a bowl of this and a bowl of another common food side by side and then measuring to see how much of each food the animal eats. This is called a palatability test. Until the right palatability is reached, no diet will work. To make a food palatable, every animal must be studied separately. Dogs have a sweet tooth. Monkeys like chocolate and other flavorings. Bears like biscuits and alligators like food that floats. Cats are so finicky that some will actually starve themselves to death before eating a nutritious food. What do they look for? The food must smell and "feel" right when they chew it.

Sorry, Theracon, but it didn't "crunch" right!

Is The Food Economical and Reliable?

The last step before sending the energy-rich, digestible, nutritious, and palatable diet to the manufacturer is to make sure that it is made from foods which can be readily purchased in good quantity and quality. They also must be sure the final product will not break down on the grocer's shelves before getting to the animal. Theracon checks these factors by considering the economics of the ingredients when they do early testing and by devising new methods when needed to preserve food in cans, bags, or whatever.

STUDENT SELF-TEST

1) Give an example of a human food that is digestible but not particularly nutritious.

2) Can you think of a nutritious food that is not digestible?

3) Write down an example of a balanced, nutritious meal that would not be palatable to you.

4) If Theracon developed a new experimental diet, how would they test it for digestibility and palatability?

5) What role does a "Scan" diet play in nutrition research?

6) Why should a nutritious and economical dog food be made from many different kinds of food.

7) Why should more than one kind of protein be included in a person's, or dog's diet?

8) Which of these diets would be most economical?

Diet A (canned) - A normal dog requires 400 grams a day to keep healthy. The food costs 6 cents per 100 grams.

Diet B (dried) - A normal dog requires 90 grams a day to keep healthy. The food costs 15 cents per 100 grams.

TOPICS AND CONCEPTS

6) Students shall indicate that fats and carbohydrates should supply most of a person's energy requirements.

13) Students shall be able to select from a list of specific foods the food best able to provide good quantities of all amino acids.

15) Students shall indicate that nutritionally balanced diets cannot be made from a single food source.

16) Students shall be able to select the correct comparison of fiber, protein, and mineral contents of two common foods.

19) Students shall be able to select from a list, the types of tests which Theracon uses to analyze a new diet.

21) From a set of four diets, students will be able to select the one which is both nutritious and palatable for most humans.

22) From a list of four food ingredients, students should be able to select the one which humans cannot digest.

23) Students shall select the best sentence explaining the value of cereals in the food of carnivores.

24) Given the costs and quantities of foods consumed by an animal, students shall be able to select the most economical food.

25) Students shall indicate that good nutrition is always important, but most critical during growth and pregnancy.

SUGGESTIONS FOR PRESENTATION OF PAPER C

Pages 3-12, in the pamphlet "Canine Dietetics," will provide a good background for a class presentation of this paper.

This paper was written to begin to move student understanding from the general to the specific and applied level of nutritional knowledge. Class discussion of the self-test should help meet most of the behavioral objectives above. The field trip will focus much attention on the objectives of this paper. As further review, ask the slower students in the classes these questions.

1) How do you know if the food is usable in the animal?
   (Most of it will be retained in the animal's body.)

2) What happens if the food is not nutritious?
   (The animal's, or person's, size and health is reduced.)

3) Why are carbohydrates important?
   (They supply energy and let proteins be used to build the body.)

4) Why is palatability important?
   (If the food isn't edible, it won't be used.)

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. Give an example of a human food that is digestible but not particularly nutritious.

A. Sugar, candy, desserts, and soft drinks are all digestible, but not very nutritious.

NOTE: These foods all provide calories which are essential for nutritious meals. However, they do not provide other nutrients in proportion to calories.

Q 2. Can you think of a nutritious food that is not digestible?

A. No. It must be digestible before it can be nutritious. (Some non-digestible materials, such as the fibers in plants are essential for health of the intestinal system, but fibers provide no nutrients.)

Q 3. Write down a balanced, nutritious meal that would not be palatable to you.

A. Liver, beet greens, rye bread, and buttermilk is nutritious, but not too palatable for many people.

Suggestion: Ask for several student diets and make sure that they are nutritious, but not palatable. Ask students to suggest nutritious diets that are palatable.

Q 4. If Theracon developed a new experimental diet, how would they test it for digestibility and palatability?

A. a) Digestibility--weigh food going in and coming out and measure the difference.

b) Palatability--place pans of the test food and another diet in front of the animal and determine which one he eats.

Q 5. What role does a "Scan" diet play in nutrition research?

A. It allows the researcher to find out exactly what nutrients are essential for each animal. (Dogs need zinc at a level of parts per billion in their food, but without it they become very sick. This was discovered using a "Scan" type diet.) The "Scan" diet is usually used to look for mineral requirements in the research animals.

Q 6. Why should a nutritious and economical dog food be made from many different kinds of food?

A. Dogs are like people--they need a wide variety of foods to get all of their nutrients. For instance, calories and proteins can be supplied entirely from meat; but it is much more economical to mix types of meat with cereals and plant proteins to get a cheaper and nutritious diet.

Q 7. Why should more than one kind of protein be included in a person's, or dog's diet?

A. It is necessary to eat a variety of proteins so that all important amino acids can be obtained. One kind of protein may be low in some amino acids and high in others. Since the extra amino acids will not replace the missing ones, large quantities of the protein or other kinds of proteins must be eaten. (The only perfect natural proteins for humans would be human milk or human flesh--all other proteins do not have quite the right combination of amino acids for us.)

Q 8. Which of these diets would be most economical?

Diet A (canned) - A normal dog requires 400 grams a day to keep healthy. The food costs 6 cents per 100 grams.

Diet B (dried) - A normal dog requires 90 grams a day to keep healthy. The food costs 15 cents per 100 grams.

A. Diet A would cost 24 cents per day. $(400 \text{ grams} \times \frac{6\text{¢}}{100 \text{ grams}})$

Diet B would cost 13.5 cents per day. $(90 \text{ grams} \times \frac{15\text{¢}}{100 \text{ grams}})$

In general, dry food is always more economical than canned food, since 80 percent of canned food is just water.

NOTE: A good follow up of this question would be to figure which brand of peas, or other canned food is the most economical. Buy several brands, drain the liquid, and divide the remaining volume into the original cost. Students may get a real awakening to the value of consumer awareness, scientific testing, and math usage.

FOOD PROCESSING AT HILL'S

After Theracon has developed a nutritious diet, it is released to a food processor. The Hill's plant in Topeka is one of the plants for which Theracon has developed a variety of diets.

The Hill's plant in Topeka is one of the many food producing plants owned by Riviana Foods, Inc. This plant produces about 15 different kinds of animal foods. It makes commercial dog foods, prescription diets sold only by veterinarians, science diets, and balanced diets for zoo animals. The film "Hill's" shows how a food processing plant operates. Human foods are canned in a very similar manner.

Hill's Methods

This paper will give a little background on Hill's techniques and ingredients. Hill's uses many kinds of meats for the different kinds of foods. Much of the red meats, or muscle protein, comes from old horses which are slaughtered in South America, frozen and shipped to the United States. Some old horses are also slaughtered in Topeka to help make a nutritious and reasonably priced food. Ingredients such as fish meal, chicken and beef by-products, and many other types of meat will also be needed to meet the recipe that Theracon has developed. When any of these materials are received, several samples of each shipment of meat are tested for moisture, fat, protein, and ash (minerals) before being used. This assures the company of its ability to follow the correct recipe and produce foods of consistent quality.

The cereals which provide many of the necessary calories in the food are automatically stored, mixed with vitamins, measured and added to the ground meat. The cereals are also tested for moisture, fat, protein, and ash before being used. Hill's maintains their own laboratory and quality control department with a staff of seven. They also use Theracon facilities when needed for such things as vitamin checks.

As production in the plant proceeds, the quality control staff also checks the food for net weight, color, moisture, protein, fat, ash, calcium, and phosphate. Chunky foods have the size and number of chunks checked. Dry products have their sorbate concentration checked to make sure that it is within carefully controlled limits. Sorbate is an additive which controls mold growth in food. Samples of each day's run are sent to Theracon to be tested on dogs before any shipment is sent to the customers.

Like many other meat processing and canning plants, Hill's is also concerned about pollution. The incinerator which is used to burn waste paper, is gas powered with "after burners" to assure complete combustion. It meets government standards. Waste meat products are shipped to Missouri where a rendering plant uses everything possible from the animals. Metal waste from the can manufacturing is recycled back to Illinois. Liquid waste from the processing plant enters the Topeka sewage system, where our sewage plant cleans the water before it enters the river. Thus, the plant is doing a good job of controlling its pollution.

Sanitary conditions, which are checked by the federal government inspector, are maintained throughout the plant. Hill's and other food processors have trouble offering tours because of the sanitation problems caused by a large number of visitors

Hill's Products

One kind of food manufactured at Hill's is its PRESCRIPTION DIET. PRESCRIPTION DIETS are prescribed by veterinarians for ill dogs. Among these diets are the following:

HD - a diet for dogs with heart disease. It's low in sodium.
KD - a diet for dogs with kidney disease. It contains very high quality protein which causes less strain on the kidneys.
RD - ration diet for overweight dogs contains high fiber levels to keep dogs full while supplying necessary nutrients for dieting.
ID - a soft diet for dogs recovering from operations or experiencing intestinal problems.

Maximum stress diets are also prescription diets which contain high levels of calories and good protein for hunting dogs, sentry dogs, and police dogs that must be very alert for long periods of time.

Hill's SCIENCE DIETS products contain very, very carefully controlled amounts of everything needed for a balanced diet for particular animal. Thus, scientists studying animals on this diet will know that any changes in the animals' behavior or appearance is not due to diet changes.

Hill's zoo diets (ZU-PREEM) provide nutritious diets which are used by about 80 percent of the zoos in the United States. These diets allow the animals not only to exist, but to grow, have offspring, and thrive. One of the reasons for the Topeka zoo's success in raising young animals is that Hill's zoo diets are used with many of its animals. Thus, as we humans destroy more and more of the world's animals, our zoos can help keep the rarest animals alive on good diets. Hill's also makes several kinds of nutritionally complete and regular commercial dog foods for purchase in grocery stores.

One interesting sidenote about pet food - many more cans of food than are needed for pets are sold in large cities. It is suspected, but has not been proven, that people are eating the foods. This is probably good, since a can of good dog food is much cheaper and more nutritious than hamburgers, potato chips, and cokes. Perhaps some day the people who manufacture human food will need to supply the same information on food quality which is now required of dog food manufacturers.

Hill's is one of the leaders in the pet food industry. They do extensive testing of every diet on animals before making the food, and they use the Theracon research facilities to test samples of their foods to make sure the quality remains high as production continues.

Not all manufacturers of pet food meet these standards. Right now, the "Guaranteed Analysis on the side of a can of food is nearly worthless. For instance, nothing is said about the digestibility or amino acid content of the proteins. "Maximum ash, 1.5% may mean that as little as 0.05% is actually present. The statements on the side of the can are truthful, but do not provide enough information to really evaluate the food's value. They do, however, provide more information than most human food manufacturers provide. Hill's and other people have been trying to get state governments, the Federal Trade Commission, and other regulatory bodies to adopt this requirement for dog food. To be labeled "NUTRITIONALLY COMPLETE," a food must be fed to a variety of dogs from puppies through nursing bitches. These dogs must show good health from blood tests, visual examinations, and other studies throughout the trial period. If this standard is adopted, then you could be sure that the dog food you purchase (if it is labeled "NUTRITIONALLY COMPLETE") will provide a nutritious food for your pet.

STUDENT SELF-TEST

1) Why are cereals necessary in dog food?

2) What are the basic differences between a Science Diet, a Prescription Diet, and a commercial dog food?

3) Why would the term "nutritionally complete" be a better label for shoppers than the present "guaranteed analysis" which lists what is in the foods?

4) What checks are made to make sure that the Hill's dog food will be of high quality? (Complete after viewing the "Hill's" film.)

5) Which of these canned dog foods, A or B, will raise the healthiest dog? Why?

A. Guaranteed Analysis

Crude Protein	8.0 % minimum
Crude Fat	2.0 % minimum
Crude Fiber	1.5 % maximum
Ash	3.5 % maximum
Phosphorus	0.50% minimum
Calcium	0.35% minimum
Salt	0.50% maximum
Moisture	74.0 % maximum

B. Guaranteed Analysis

Crude Protein	14.0 % minimum
Crude Fat	5.0 % minimum
Crude Fiber	1.5 % maximum
Ash	2.0 % maximum
Phosphorus	0.28% minimum
Calcium	0.34% minimum
Salt	0.43% maximum
Moisture	78.0 % maximum

6) What information would you like to find on the sides of canned and packaged human food?

TOPICS AND CONCEPTS

6) Students shall indicate that fats and carbohydrates should supply most of a person's energy requirements.

15) Students shall indicate that nutritionally balanced diets cannot be made from a single energy source.

23) Students shall be able to select the best sentence explaining the value of cereals in the food of carnivores.

24) Given the costs and quantities of four foods consumed by an animal, students shall select the most economical food.

25) Students shall indicate that good nutrition is most important during growth and pregnancy.

26) Students should indicate that human foods should have accurate and usable information on the food package about the nutritional value of the food.

TEACHER SUGGESTIONS - PAPER H

In presenting this paper, two concepts will need particular elaboration. The first one is the effect calories have on protein utilization. The basic reason that cereals are used in dog and cat foods is to provide calories, or energy, with carbohydrates so that proteins will not need to be used for energy in the animal. In othe words, if a low calorie food is fed to the animal, much of the protein in the food will be burned for energy, if the animal is not overweight.

If a food with enough cereal and fat to supply the necessary calories is fed, then the proteins will be used to build the body, not just for energy. This will mean tha the food is much more nutritious and that the kidneys will not have to work so hard to get rid of the wasted by-products of protein oxidation.

In short, most cereals do not have enough protein in them to really help fulfill a carniverous animal's protein requirement, though they can help man quite a bit. Their major reason for being used in pet foods is to supply adequate calories to free the available protein to meet the animal's need for building blocks, not energy.

The other concept to elaborate on with this paper is that of the value, and lack of it, on the guaranteed analysis labels. The argument presented on pages 5-7 in Canine Dietetics' provide an excellent criticism of current labeling practices. After criticizing the practice of labeling pet food, then have the students consider the labels on human food. With the notable exception of breakfast foods, there is almost no nutritional labeling of any sort. When buying a can of beef stew, or a boxed mix for beef stroganoff or [illegible] shopper can get no idea of the food valu of the ingredients.

Use transparency #3 with student question #5.

Point out to the students that this problem can be handled by writing congressmen, senators, and the president to press for better human labeling laws, or write individually to the companies. The companies making the product are required to send information regarding its nutrient analysis upon request.

A good class project would be to write letters to every maker of boxed and canned mixed foods and request nutrient analyses.

Human food manufacturers and our government are very slowly improving in this area, but quicker and more complete legislation will result if more people express concern.

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. Why are cereals necessary in dog food?

A. They provide many of the necessary calories for a nutritious diet, and reduce the need to burn proteins to obtain energy.

Q 2. What are the basic differences between a Science Diet, a Prescription Diet, and a commercial dog food?

A. a) A Science Diet has a very strict and nutritious recipe which requires exactly the same ingredients in every batch. In this way, a scientist can be sure that his animals are always eating the same things and that their diet is nutritious.
b) A Prescription Diet has a recipe which will help cure a sick animal. It usually contains special ingredients which are not as cheap as commercial diets.
c) A commercial dog food is made of the least expensive ingredients which will be accepted by the dog and its owner. It may, or may not be nutritionally complete (this depends on the manufacturer), and its ingredients will vary according to market conditions.

Q 3. Why would the term 'nutritionally complete" be a better label for shoppers than the present 'guaranteed analysis" which lists what is in the food?

A. To be labeled "nutritionally complete," a food should have been tested growing pets, pregnant, and lactating females. All of these groups should have remained healthy with the diet. Therefore, the shopper's pet should remain healthy. The term "guaranteed analysis" has too many loopholes to to really get an accurate picture of a food's worth.

Q 4. What checks are made to make sure that the food will be of high quality?

A. Frozen meat and grains are carefully checked for moisture, protein, ash, and other qualities. Quick rapid moisture tests are performed on cans before being cooked. All of the things on the guaranteed analysis label are checked on sample cans. Number of meat chunks in a can, meat temperature of the can filler, and many other checks are made on the production line.

Q 5. Which of the canned dog foods described below will raise the healthiest dog? Why?

Transparency #3 contains the Guaranteed Analysis and ingredient lists for the two diets used in the student question. The comments below will help you discuss the transparency.

1. Crude Protein: The values are nearly meaningless unless the digestibility and amino acid values of the proteins are known (Note the ingredients of the two diets).

2. Crude Fat: Both diets may have 50% fat, since the label only indicates the minimum fat contained. (Dogs should get 25-40% of calories from fat, so some fat is essential.)

3. Crude Fiber: Neither diet has high levels of fiber. (High fiber foods are used to make reducing diets for dogs).

4. Ash: Ash contains all needed minerals-both diets could contain 0% ash under this label system. No really useful information is given. Nursing bitches have a strong need for minerals (ash) in the right composition.

5-6. Calcium and Phosphorus: Calcium levels must always be above phosphorus for best health. Diet A is clearly at fault here. Both foods indicate only minimum, not actual levels, so both could be poor or adequate in this regard.

7. Salt: Dogs need no salt--excess salt may hurt dogs with bad hearts.

8. Moisture: Note that about 3/4 of both diets is only water.

Ingredients

1. Protein Sources: 'Meat by-products' may mean anything from clean, nutritious organ meat to indigestible tendons, feathers, and hair. This may mean that diet "A" has no high quality protein with good mixtures of all amino acids. Soybeans and navy beans both need additional amino acids to supply all protein needs for dogs and humans.

2. Cereal Products: Diet "B" is forcing the dog to extract all energy from either proteins or fat. Some cereals would help lower the food's cost while relieving the strain on the dog's kidneys.

3. Vitamin Supplements: Vitamin supplements are expensive and will seldom appear unless the diet has been well researched. Since canning destroys some vitamins, excess amounts must be added to maintain the proper levels after canning. Diet A is probably quite low in this area.

4.	Mineral Supplements:	All meat and high bean diets require additional calcium and other minerals. Diet A is definitely deficient.
5.	Food Coloring & Preservatives:	Sodium nitrite adds a pink color and helps preserve food. Iron oxide adds a red color to food.

General Comments:

Listing ingredients is no guarantee that they are really included. It just indicates they may be included. The label, as now required by law, does not give enough information to fully evaluate a food. It does give us more information about dog food than is usually shown on human food packages. The best guarantee for purchasing a quality dog food is to buy food labeled 'nutritionally complete.

Q 6. What information would you like to find on the sides of canned and packaged human foods?

A. After discussing question #5, these points should emerge.

a) Either a food should have maximum and minimum limits published for each major nutrient, or

b) All foods should indicate the % of daily human nutritional requirements met by a serving of the food for an "average" human.

c) The digestibility and quality of the food should be indicated. (In the case of meat by-products, kidneys might have a digestibility of 95% and a quality of amino acids rated at 100, while hair might have a digestibility of 0%.)

d) The pull date, or time the product should be removed from the shelves and discarded should be indicated.

NUTRITION AND THE GROWING POPULATION

The human population of nearly every country in the world is growing. Ireland is the only country which has a stable, or non-growing, population; the other industrialized nations, such as the United States, Britain, France, Japan, and the U.S.S.R. are growing slowly. Most non-industrialized nations are growing at a fantastic pace. This includes most countries in South America, Latin America, Africa, and Asia.

Just how fast the non industrialized nations are growing can be seen in Columbia--a typical country. Columbia will double its population in 20 years at their current pace. This means that in just 20 years, the country will need twice as many homes, water systems, sewage systems, hospitals, schools, doctors, judges, and grocers. Right now, 30 to 40 percent of its population cannot read, 50 percent of its people are 15 or younger, the average family spends 80 percent of its $237 per year income on food, and over 30 percent of the people are malnourished. From this start, how can Columbia, or any underdeveloped country, hope to feed, educate, and care for the health of its rapidly growing population?

This paper will look at only one aspect of the growing population problem--nutrition. The paper will look at some of the ways which may be used to feed more of the world's population and some of the limits to more food production.

More People Can Be Fed Now

Before we look at food sources for the future, it should be made clear that we could feed more of our people right now. For instance, all countries have portions of their population that are overfed, and whole countries, like the United States, eat more food as a nation than they really need. In addition, industrialized countries, like the United States, Japan, U.S.S.R., and Britain import cheap protein food from poor countries. The imported food keeps food prices down in the industrialized countries, but it can deprive people living in poor countries of necessary food. For instance, during recent years the United States has really put pressure on meat exporting countries to send us more beef in order to drive our own food prices down. The United States now imports more than a billion pounds of beef each year. Several poor South American countries have limited the beef sold to their own people since their governments are behind on their beef exports. In short, their government considered export money more important than the nutrition of its citizens. The industrialized governments considered low prices more important than the diets of people in poor lands. This same pattern of rich importing food from the poor has happened for many products sold between nations throughout the world. For this reason, many people feel that more people could be better fed if economists and governments placed higher priorities on feeding all of the people throughout the world.

Better distribution of food in each country does have merit, and we could feed more people by sharing food more evenly. However, we should realize that less than 10 percent of the world's population are eating more than they need. Even by cutting back on their food, we could not adequately feed the more than 30 percent of the world that is malnourished. We could certainly help the problem, but we could not cure the problem with better food distribution. Furthermore, we certainly could not hope to feed the increased number of people expected in 20 years with today's food production. Most would be malnourished and starving no matter how well the food was spread throughout the world. Therefore, ways of producing more food must be found until the world's population growth stops. Most of the possibilities for producing more food are dependent on the skill of our food scientists, the will of our government, and the state of our environment.

Protein - Our Most Desperate Need

No one food nutrient is in such short supply as is protein. Kwashiorkor, the disease caused by lack of protein, is the most common serious deficiency disease in today's world. Children with Kwashiorkor swell up, grow large bellies, have thin arms and legs, and eventually their skin cracks and oozes out serum that attracts flies. Even if the child is saved, he will suffer brain damage. Research indicates that the average person should have at least 70 grams of protein daily to grow and stay healthy. Most underdeveloped countries average less than 15 grams of high quality (animal) protein per person daily, and the plant proteins cannot fill the gap. Hidden by these averages are people in all countries who get much less than the average amount of protein. If more protein could be put into the diets of the world's population, many nutrition problems would disappear. The low level of calories throughout the world makes the protein deficiency worse, since the body does not have enough calories or proteins to remain healthy.

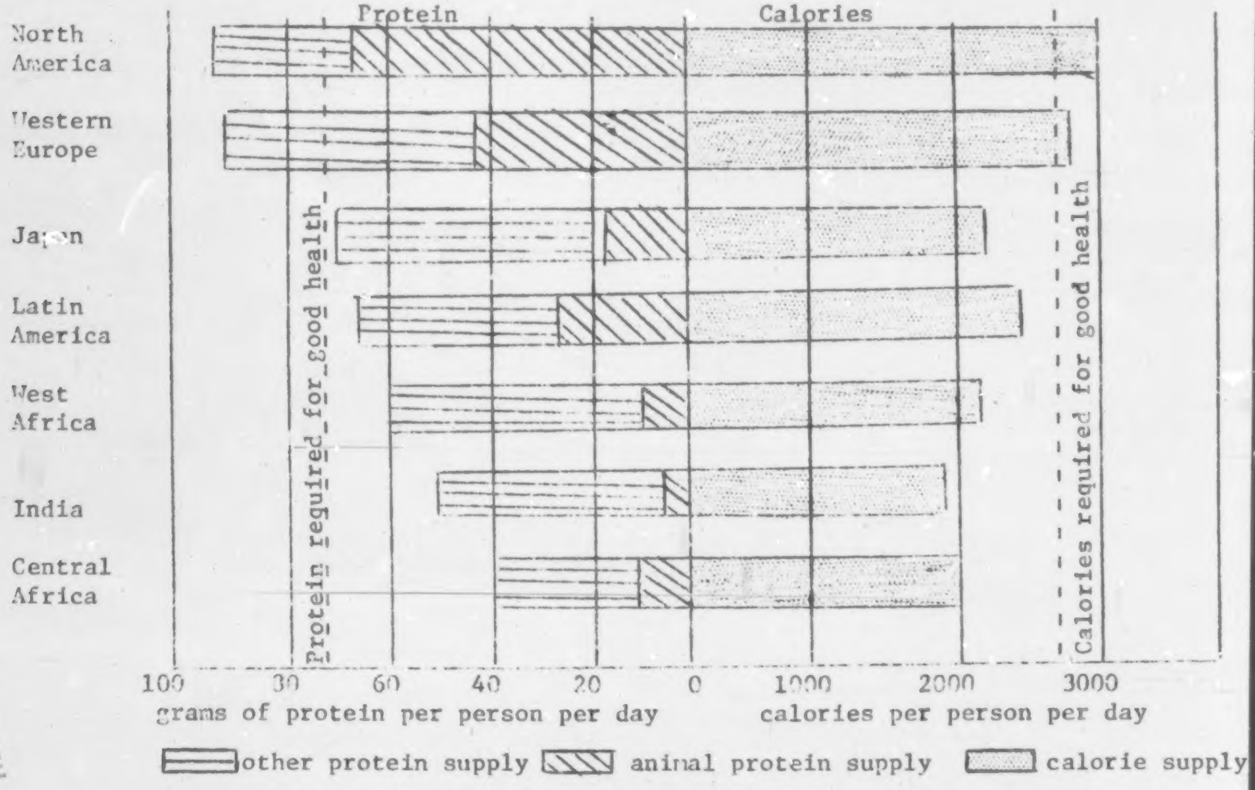


Figure 1. Protein and Caloric Intake of Selected World Populations

Lines indicating calories and proteins required are those required for the average North American. The assumption has been made that if diets in other regions were sufficient to allow people to develop their full potential body size, requirements would be the same everywhere.

BEST COPY AVAILABLE

Can The Oceans Provide More Protein?

The sea is selected by many to satisfy the world's rapidly growing demand for protein. Fish powder, which is made by grinding up and dehydrating whole fish, contains cheap protein with excellent value for man. One advantage of the fish powder discovery is that it uses fish which used to be considered inedible. Small bony fish can be ground to powder just as easily as the large, but increasingly hard to fine, fish such as tuna and salmon. The fish bones add calcium and minerals to the powder, and make it more nutritious than meat alone. When this powder is mixed with other food, about one penny's worth can supply a person's daily need for protein. This food may be mass produced in the future.

Ground up algae may also feed much of the world, but right now no one has figured out how to make it palatable (appealing) for most people.

However, there should not be too much optimism about the oceans' ability to feed us. In order for the animals and plants to grow, they need the nutrients washed off our land. The most productive parts of the ocean are along the shores of our continents; and most of the vast center of the ocean is like a desert, as far as food production is concerned. Along these shores, estuaries and swamps play a big role in providing breeding grounds and food for many, many kinds of ocean animals. Man is now busily diking, draining, polluting, and destroying these breeding grounds. In addition, he cannot catch too many more fish than now without beginning to destroy the populations of several important kinds of fish. In short, there is some hope for finding more food in the ocean, but the ocean will be no cure all. Careful management of the ocean and its shores will be required if it is to supply more food than it does now. You should expect to see more international disagreements over many aspects of fishing rights in coming years. Many countries will try to extend their water boundaries in an effort to provide more fish for their rising populations.

The United States is using only about 60 percent of its farmable cropland. Many people have argued that we should increase our acreage and try to feed more of the world. However, of the land we are farming, most of it is eroding faster than it is being built up. In Shawnee County alone, only about 35 percent of the land under cultivation is adequately protected from erosion; and we cannot long continue the erosion we are now experiencing. Fertilizers can help make poor soil produce, and some type of fertilization is necessary for the continuous growth of good crops on even good soil. However, fertilizer cannot replace the tons of good soil which yearly floats down our rivers. By increasing the number of acres we plant, we would only accelerate the erosion of our farm land and hasten the coming of another dust bowl or famine. We *could* produce more food this way, but for how long?

Tropical countries also contain many acres of land which could be cleared for farming. Some people see this as the answer, but these people have never seen a tropical farm. Soil in the tropics is extremely poor because the heat quickly destroys the humus, or decayed plant material necessary for good soil. The minerals are rapidly drained away from the soil, and the use of the best of our current farming techniques for grain crops will completely ruin a patch of ground in less than five years. This is why native farmers cut the forest, farm the land for two or three years, then move to a new place and let the forest grow back before it's too late. This method of farming is not likely to increase the food being grown now, but it's the best kind for the long run.

In other countries throughout the world, the answer is the same--we are farming as much land as we should farm now. If we are to worry about the long-term condition of our land and our health, more food must come in another way.

Can Land We Now Farm Produce More?

The land being farmed can produce more food. We are now using fertilizers, pesticides, new types of disease resistant crops, and higher yielding crops. More and more of the world's farmers are learning to use these techniques and the tremendous growth in their use is the reason severe famines have not touched the world during the last few years. As more farmers use fertilizers, pesticides, and more crops are produced, we will continue to increase our ability to feed the world. However, few plant scientists are willing to predict that they can keep on improving crops fast enough to take care of the rising population. It took many years to create corn that would produce 150, not 75, bushels to the acre. Can we expect to double this 150 to 300 bushels in 20 years? Populations in many countries are doubling at that rate. What will this intensive farming do to the land and water as we increase our force feeding of fertilizers, pesticides, and herbicides? In short, we have been rapidly improving the yield of food, but few people will predict how long this can continue and what permanent environmental damage will result.

Will Synthetic Foods Save Us?

Soybeans, which provide a pretty good protein by themselves, can be spun into threads and have amino acids, fats, synthetic colors and flavors, minerals, and vitamins added The threads can be woven into products which look, cook, chew, smell, and taste like meat. This "mock meat" is now being used throughout the United States, and is found in nearly every kind of dehydrated meat dish you could buy. Using this method, one acre of soybeans can produce 1,500 pounds of mock meat. The same acre of alfalfa could produce only 43 pounds of real animal meat.

Soybeans are now being used throughout the world to help satisfy the need for protein, but the cost of this nutritious mock meat is still too high for many of the poorest to use. An enriched soybean flour is also used, but it takes much education to teach someone who cannot read how to use a new and very different kind of food.

Some people have also shown that oil can be turned into food. However, the process is expensive and oil is definitely in short supply. The chance of using it for food is quite small.

Other synthetic foods are also being developed, but it is very hard to make a nutritious artificial food cheaper than a natural food. The same people who will be malnourished on natural foods will also be unable to afford synthetic foods. Perhaps this will someday change, but for now, we would have to say that synthetic foods are promising, but unproven so far as feeding the world is concerned.

Can We Make It?

With the current rate of world population growth, one would have to say no. We may be able to feed people as well as we do now (with one-third or more of the world presently malnourished) for the next 10 or even 20 years. But there must come a point where human growth will badly outstrip our food supply if the growth does not slow and stop. Whether that growth stops soon, or much later, depends on the people that are under 30 in the world today. How long we can continue to feed growing populations even as well as we do now depends on three key links--the scientists who discover new types of food, the businessmen, economists and governments who distribute the food, and the environment which produces it. One or all of these links will break from the strain if the world's population continues its rapid growth.

STUDENT SELF-TEST

1) Which two food nutrients are in the shortest supply throughout the world? (You'll need to figure out one for yourself--it's not in this paper!)

2) What two new food developments could give the world the most new protein in coming years?

3) Should more land be farmed throughout the world?

4) What are the main disadvantages to synthetic foods?

5) Why can't we count on more and more food from the land we now farm?

6) In 1950, Mexico had a population of 26 million, and at least 13 million people had inadequate diets. In 1970, its population had risen to 45 million, and 21 million people had inadequate diets. Its food production had doubled, and its population nearly doubled. Would it have been better to stay at a population of 30 million and feed everyone well? What is your opinion?

TOPICS AND CONCEPTS

13) Students should be able to select from a list of specific foods the food best able to provide good quantities of all amino acids.

14) Students should be able to select the nutrient in shortest supply throughout the world.

21) From a set of four diets, students shall be able to select the one which is both nutritious and palatable for most humans.

25) Students should indicate that good nutrition is most critical during growth and pregnancy.

28) Students shall indicate that low levels of minerals and protein most frequently cause permanent mental and physical damage in humans.

29) Students shall be able to select the best statement evaluating the potential of various new foods for fulfilling world protein requirements.

30) Students shall be able to evaluate the potential for improving crop yields using present farming techniques.

SUGGESTIONS FOR TEACHING PAPER I

During the 1970's Americans will experience the results of a growing world-wide demand for food. Our grains are purchased in huge quantities by many countries who have accumulated billions of dollars over the past decades. In coming years, we will doubtless swing back and forth between seasons of plenty and shortages. Each swing up will be accompanied by shouts of joy that we have finally "solved" the world's food problems, and food surpluses in the United States. Each season of shortages will find tighter supplies and higher prices in the United States. Overall, though, food supplies will be in shorter and shorter supply throughout the world, and the countries buying our grain will be those who can afford our prices. The underdeveloped and poor countries will continue to have more and more malnourished people.

Many students will indicate, upon reading this paper, that our population growth has now reached zero. That is far from the truth. The reproductive rates of the women now having children has dropped to about 2 children per woman. This means only that we will eventually have a population which levels off if we continue the present trend for the next 40 years. Paper J will discuss this in more detail.

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. Which two nutrients are in the shortest supply throughout the world? (You'll need to figure out one for yourself--it is not in this paper.)

A. a) Protein of high value--(plant proteins, such as peanuts and soybeans, are in good supply, but need added amino acids to be able to adequately sustain human life). These amino acids are not easily and economically available.

b) Minerals, such as iron and calcium are the second set of nutrients causing major health problems. We get these minerals primarily from milk and meat products, which many people cannot afford.

Q 2. What two new food developments could give the world the most protein in coming years?

A. Probably wider use of fish powder and enriched soy meal flour.

Q 3. Should more land be farmed throughout the world?

A. There is no "right" answer, but for the sake of unborn generations, we hope you can convince the students that the answer should be no, unless conservation techniques are drastically improved on existing farm lands. As of now, for every acre of new farm land added in the world, we're losing many acres of over-used and under-conserved land.

Q 4. What are the main disadvantages of synthetic food?

A. Cost, and teaching people how to use them.

Q 5. Why can't we count on more and more food from the land we now farm?

A. a) Erosion is destroying farm land now used.

b) Water, fertilizer, weed, and insect control can only help reach a plant's genetic potential. Any further increases are going to be very slow.

c) Eventually, even the genetic characteristics will probably reach a level that cannot be significantly improved in a reasonable amount of time.

Q 6. In 1950, Mexico had a population of 26 million, and at least 13 million people had inadequate diets. In 1970, its population had risen to 45 million, and 21 million people had inadequate diets. Its food production had doubled, and its population nearly doubled. Would it have been better to stay at a population of 30 million and feed every one well? What is your opinion?

A. Let the students tackle this problem for a while. Try to bring out both sides of the issue (ie. - We have no right to determine who should and should not be born vs. morally, we have no right to overload the world). Then, of those who argue that the maximum number of people is best, ask them if it would also be best to distribute the food evenly so that everyone would be equally malnourished. Ask them if the same solution should apply world wide, with the United States cutting down on eating in order to feed others. For those who would argue that a controlled population is best, ask them who should not have reproduced during that 20 years. Should all people be limited to two children? Should only the rich, or only the poor? Who should control the growth--individuals did not do it for themselves, or growth would not have occurred.

FOOD ADDITIVES

Manufacturers of food use additives to make foods: 1) palatable, 2) appealing, and 3) able to be stored until the consumer uses the food.

No broad subject dealing with food probably upsets more people than the subject of food additives. Many people complain about mercury, nitrates, pesticides, food coloring, and chemicals being in foods. Others reply that without preservatives, pesticides, and added nutrients, your diet would be much poorer. This paper gives a brief summary of the arguments and reasons used by those on both sides of this controversy.

What Is An Additive?

Intentional food *additives* are substances intentionally added to foods for a useful purpose. For instance, they may preserve the nutritive quality of the food, add flavor, help to preserve the food, or provide color.

Incidental additives are substances which unintentionally enter the food during its growth, processing, storage, or packaging. These are not intended to remain in the food and serve no useful purpose in the final product. Incidental additives could be poisons (such as lead or insect spray), insect parts, or anything present at a very low and safe level.

Adulterants are either poisonous substances which were added above a safe-use level, or are materials added to cheat the consumer. Any adulteration of food is illegal, and this paper will not go into the many different ways food can be adulterated or the legal hassels involved in defining adulteration.

Additives Are Chemicals

All additives and all foods are chemicals. For instance, salt is sodium chloride, vinegar is acetic acid, corn starch is amylum, and cream of tarter is potassium bitartrate. These products are not marketed under their chemical names, since this would keep people from buying them. The same thing applies to many additives, but they have no common name. Therefore, an additive which may be a part of coconut oil will be listed by its chemical name, since it has no single common name.

Most additives are derived from foods and other natural sources. Some are artificially created but can be found in natural foods. Some are artificial without known natural equivalents.

Manufacturers may either call an additive by its common name (Vitamin C) or its scientific name (ascorbic acid). In any case, whether we are talking about the Vitamin C found in health foods, orange drink, vitamin pills, or breakfast cereal, it is exactly the same chemical. Therefore, the important thing to consider with additives is not what their name looks like, but rather *why* they were added and the *effect* they have on you.

How Are Additives Used?

Nutritional additives have helped remove goiter, rickets, and pellagra from lists of common diseases of Americans. With the addition of iron, and some amino acids to our bread, we probably could eliminate much of the protein deficiency and anemia problems of America today. However, this cannot be legally done right now.

Flavoring additives, such as naturally occurring spices and the artificial aromatic chemicals give us such flavors as ginger, cloves, pepper, citrus, pineapple, cherry, and wintergreen. In fact, we use the equivalent of five times our annual grape production in artificial grape flavoring.

Antioxidants help trap oxygen and keep fruits and oils from turning rancid. Without these additives, we could not have cake or pancake mixes, since shortening in them would spoil. Our fruits would either look spoiled more often or be more expensive and in shorter supply. Without mold and bacterial inhibitors, all breads and even fruit jellies would quickly spoil. Salt, sugar, and smoke are natural mold inhibitors Many new anti-oxidants are now used in bread products.

Emulsifiers help keep products mixed which would naturally separate without the emulsifier. Without emulsifiers, mayonnaise and salad oils would quickly separate, cocoa butter and chocolate would separate in candies, and ice cream would not stay smooth and creamy.

Coloring additives will allow a good food that has changed color, or is not a "natural" color, to look good enough to eat. For instance, some of the best oranges are green when they are ripe. However, housewives won't buy an "unnatural" green orange. Therefore, orange growers artificially color the oranges orange so that they will be purchased. Food coloring is very important in preparing soft drinks, candy, frozen desserts, jellos, pudding, meat casings, some dairy products and bakery products. Even flour would be yellow, not white, if it were not bleached.

Other additives are leavening agents to replace yeast; sequestrants to separate different things in foods; humectants to keep foods such as marshmellows moist; anti-caking agents to keep salt, sugars, and spices flowing; firming agents to give pickles their crunch; curing agents to preserve meat; foaming agents to keep toppings foamy foam inhibitors to keep foam down during bottling; and non-nutritive sweeteners for dieters.

In short, without additives, the grocery stores would not be able to supply most of the foods which Americans now eat. As our population has grown much larger, moved further from the farm, and increased the living pace, people have purchased and asked for foods that must make greater use of food additives.

Are Additives Safe?

Toxicity (poisoning) tests determine if a chemical can hurt anyone in any way. Before an additive can be used in foods, these steps must be followed:

1) Acute toxicity tests are carefully run to determine how much of the chemical would be required in one dose to injure an animal.

2) Short-term toxicity tests are run by feeding various amounts of the chemical to laboratory animals for 90 days and observing the animals' appearance, behavior, growth, death, blood changes, organ changes, and evidence of tumors.

3) Long-term toxicity tests are run on several different kinds of animals for two or more years; and all of the above studies, plus studies of fertility, reproduction, lactation, and mutative changes are made. Other studies may be required at this time if evidence suggests they are necessary.

4) Methods of accurately measuring chemicals in food are developed.

5) A petition is prepared with full reports on the safety of the chemical, reports of all tests, and evidence of the need for the chemical in foods.

6) This petition is presented to the Federal Food and Drug Administration. After evaluating the petition, the FDA can spell out a regulation which will tell the maximum amount of the chemical which can be added to certain foods, or it can demand more tests if any questions remain about the additive.

In short, the manufacturer must prove his product is safe following a set of carefully drawn up FDA regulations.

Additives - Arguments For and Against

Nutritive Additives

Against: People can eat a nutritious diet by properly choosing their foods without additives. At least two nutrient additives - Vitamins A and D have been shown to cause health problems when taken in excess. Other nutrients, such as Vitamin C, are more effective when taken from natural sources. The artificial Vitamin C just does not work as well as natural Vitamin C.

For: People do not choose a balanced diet from natural foods. It would be more expensive, and some people are too finicky or not well enough informed to make the right choices. If we did eliminate nutritive additives, some of our population would still have rickets, pellagra, scurvy, and goiter. By adding nutrients in reasonable levels to our common foods, most nutrition problems can be solved. The FDA recently lowered the level of Vitamin D in many common foods, although no one could show that health problems existed because of too much Vitamin A or D except in the case of excessive use of vitamin pills. As for Vitamin C, there is evidence that some trace minerals in citrus fruits aid the effect of Vitamin C. As soon as these are determined, they too could be added to the artificial vitamin C so the combined Vitamin C plus minerals would be more like natural sources.

Color Additives

For: By adding color, perfectly good foods which lose color during processing, or lack natural color, can be made attractive and eatable. There is no reason to waste good food, and the FDA very carefully checks all additives for safety. Colors have been regulated for about 70 years. During that time, scientists have added better and better tests that colors must pass before being certified for use. According to our present laws, no color additive may be used if it has been shown to cause cancer in any dose.

Against: Why add a chemical with no food value? By making food look appealing, you encourage housewives to select processed foods when a good natural food might be more nutritious. For instance, if weiners were their natural color (gray), more people would probably buy the more nutritious hamburger. The FDA's record in this area is very poor. After originally certifying many different colors for wide use, the FDA has decertified at least ten different dyes after evidence indicated they could cause health problems. How many certified dyes in use today will be decertified tomorrow?

Food Additives in General

Against: 1) By adding hundreds of different additives, we increase the possibility of letting a really dangerous one slip by the FDA regulations. Furthermore, we increase the chance of two or three additives combining to make an even more dangerous combination than the three taken separately. Just as alcohol and barbituates are only mildly poisonous apart and deadly when together--some additives might also become very poisonous when combined.

For: 1) The FDA's regulations are so complex and demanding that the chance of any significant danger from additives is very small. Additives shown to have any harmful effects can be used only in much less quantity than the smallest amount expected to cause harm. More research is being planned on problems caused by combining additives. We shouldn't scrap all additives because of the slight chance of health problems due to two or three additives being combined.

Against: 2) How reliable is the research put forth by the companies wanting to market a new additive? Enough money will surely buy at least one scientist to back their product.

For: 2) Money can buy some scientists, but other scientists will quickly dispute his work. The FDA must be given more money to conduct independent research, and any cheating scientist and company should be severely punished.

Against: 3) The FDA is too underfinanced and overworked to check all additives and to make sure that every company uses them only according to regulations. It would be better to cut down on their work load with fewer additives.

For: 3) Since nearly all additives are very useful to food processors, it would be a better idea to fund the FDA well enough to do a good job.

Against: 4) By putting coloring, meat taste, and texturizers, into food that is mostly carbohydrate, housewives are fooled into buying food that is cheap and mostly starch when they should purchase a balanced, nutritious diet.

For: 4) The FDA cannot rule out a food which does not hurt the body, even if it is not as nutritious as it looks. Therefore, the best route is to require food manufacturers to put a good analysis of their food on every package. Vitamins, minerals, calories, and quality of the amino acids in protein should be included on all foods whether it is breakfast cereal, weiners, rolls, or pickles. Then the housewife could shop intelligently.

In Summary

This paper has tried to paint a broad picture of food additives. The arguments presented are the strongest found in a multitude of articles and papers. The picture is certainly muddled. Probably the best thing we, as consumers, could do is to work for politicians who are interested in supporting consumer interests and working to keep the regulatory agencies well financed and alert.

STUDENT SELF-TEST

1) List the additives that you would expect to find in each one of these foods:

    a) Orange flavored drink

    b) French dressing

    c) Ice milk

    d) Lunch meat

2) Would small and harmless amounts of mercury or insect pieces be called intentional additives, incidental additives, or adulterants?

3) Which argument in this paper would most convince you of the need for additives?

4) Which argument would best convince you of the need to remove additives?

5) If you were to become the President, what steps would you take to improve the quality of foods eaten by most families?

TOPICS AND CONCEPTS

26) Students shall indicate that human food packages should have accurate and usable information describing the nutritional value of the food.

27) Students shall be able to match two different types of additives with their use in food processing.

SUGGESTIONS FOR PRESENTATION OF PAPER J

Two broad concepts should emerge from the discussion of this paper: 1) the discussions concerning additives does not result in many clearly "right" or "wrong" issues. There are advantages and disadvantages to most additives. We should encourage our government to do the best possible job of regulating the safe use of all additives; and 2) additives have made it very hard to judge food quality by appearance, odor, or taste. This makes it very important that the true nutritional value of food be displayed so the consumer can make wise selections.

A brief discussion of the types of chemicals and the foods they are found in for the different types of nutrients would help meet objective #27 of this paper. See pages 1 and 2.

For more discussion of the pros and cons of additives, see Paper N, "Would You Use This Additive?".

ANSWERS - STUDENT SELF-TEST QUESTIONS

Q 1. List the additives that you expect to find in each one of these foods:

A. a) Orange flavored drink--nutritional additives (sugar, vitamins), flavor additives (orange), coloring additives, and foam inhibitors to aid bottling speed. It might also have antioxidants to retard spoilage and emulsifiers to keep the product mixed, though both of these are questionable.

b) French dressing--flavoring additives, antioxidants to keep oil fresh, emulsifiers, and nutritive and coloring additives may also be present.

c) Ice milk--flavoring additives, emulsifiers, and coloring additives will all be present.

d) Lunch meat--flavoring additives, antioxidants, coloring additives, and curing agents will all be present.

Q 2. Would very small and harmless amounts of mercury or insect pieces be called intentional additives, incidental additives, or adulterants?

A. Incidental additives--they would not have been added intentionally during food processing and are not present in high enough quantities to be adulterants.

Q 3. Which argument in this paper would best convince you of the need for additives?

A. Encourage a class discussion and ranking. Arguments for nutritive, flavoring, and antioxidant additives and general argument number four should be among the strongest pro arguments. Be sure to have each student explain why his particular argument should receive consideration as the strongest argument.

Q 4. Which argument would best convince you of the need to remove additives?

A. Encourage a class discussion and ranking. Arguments against food coloring and general argument numbers 1, 3, and 4 should be among the strongest mentioned.

Q 5. If you were to become the President, what steps would you take to improve the quality of foods eaten by most families?

A. Suggestions: Encourage a discussion and list suggested improvements on the board. Encourage 1) better funding of FDA, 2) requirement that anything sold as food list percentage of nutrients available per normal serving for an average person, and 3) improvements suggested by pro and con arguments.

Tragedy of the Commons

The film, "Tragedy of the Commons," is a thinking man's film. It presents some facts and ideas that are pretty hard to face for many people. Many of the questions it raises cannot be answered with a simple "yes" or "no."

Add your thoughts to the class discussion and stand up and defend your viewpoints. If you carefully listen to others' viewpoints and discuss yours, it helps everyone in your class understand the film and its many ideas.

STUDENT SELF-TEST

Tragedy of the Commons (Part I)

1. Would you have acted as the herdsmen did? Why?

2. Who should be responsible for a commons? Why?

3. Do we have any commons in the world today? Where?

Tragedy of the Commons (Part II)

4. Do you think Dr. Hardin was right when he said, "We wall out people when we are in crowds"?

5. What did the scenes with the girl singing "Everyone I See Has A Smile For Me" mean to you?

6. Did you notice any new ideas about man's use of the commons?

Tragedy of the Commons (Part III)

7. What freedoms do you lose by living in a large city, instead of on a farm? What freedoms are gained?

8. Should anyone be able to tell a farmer, "Terrace your land to stop erosion, or we'll make you sell your land to someone else"? Should someone be able to tell you, "You can only have this much electricity this year. We must save our coal for future generations."? Why do you answer as you do?

9. What causes people to feel differently and have different ideas about large cities and over population?

Tragedy of the Commons (Part IV)

10. What solutions does this part of the film offer for problems raised during the first three parts?

11. Do you think we can have a maximum number of people and maximum good for all?

12. How does nature control population?

13. Should man control his own population? Why? How?

14. Why is population growth rate so important when world-wide nutrition is being discussed?

Behavioral Objective Number	Topics and Concepts Tested
31	Students shall be able to select the best summary statement about the conclusion of the film "Tragedy of the Commons."
32	Students should indicate that society should work to supply nutritious food at a price each family can afford.
33	Students should indicate that every society should strongly encourage every human to practice good environmental use techniques.

Suggestions for Presentation of "Tragedy of the Commons"

Before showing this film, try to carefully read the entire "Instructional Guide" for the film, preview the film, and then take time to carefully think out the goals you would have for your class.

The film is the most powerful tool we have seen for stimulating class discussion about man's role in his world, but, showing the film without careful teacher preparation and thought is like using a scalpel for a screwdriver.

The thing that has worked very well for us has been breaking the class into groups of four or five students. Have each group spend five to ten minutes after each film segment discussing the student self-test questions. Then bring the class back together and solicit group answers, comments, and counter-comments.

If only the class as a whole discusses the film, many students will never express themselves. If only small groups discuss the film, students may never hear strong dissenting views. The best of both worlds can be achieved by having both levels of discussion.

Work to maintain a rational, not emotional, discussion. Try very hard to avoid enforcing your value judgments. Act simply as a discussion leader who recognizes students, summarizes arguments, and tries to keep both sides of the many potential conflicts represented.

One correction should be made in the film if students ask. Part four presents a comparison of the growth rate of two and three-child families. The three-child increase should go in this fashion, since each parent would produce the equivalent of 1.5, not 3, children per generation:

Parents	Children	Children's Share of Children	so on
2	3x1.5=	4.5 x 1.5 =	6.7 x 1.5 = 10.1 x 1.5 = 15.2 x 1.5 = 22.8

In a similar vein, the two-child family would maintain its one child per parent average every generation, and its size would be 2-2-2-2-2.

The film correctly shows the growth of the two-child family, but incorrectly indicates that the three-child family would grow by an average of three children per parent, per generation, which would be the rate for six child families. The conclusions reached would be the same, but the time would be much longer. Unless a student notices the error, it would probably be better to not explain the mistake, since you will be pressed for time anyway, and the point is the same.

Answers - Film Questions for Tragedy of the Commons

There are no "right" answers for most questions about this film.

Your role in this film is to keep the class discussion balanced and as rational as possible. Act only as a director to call on students, and try to avoid saying anything, other than summarizing the total arguments presented on each question. The class should make its own decisions about the "right" answers to these questions. The instructional guide has some excellent suggestions for goals for each part of the film.

Brief suggestions for each question are included below.

Q 1. Would you have acted as the herdsmen did? Why?

A. Probably - as the film points out, the only way to get ahead is to extract energy and resources from the environment so that your own efforts can be multiplied. If your farm was over an oil field, you would be crazy to let the surrounding neighbors drain your oil.

Q 2. Who should be responsible for a commons? Why?

A. A government of reasonable men who are not directly involved in using a resource should control its use. Those making their livings from the resource should not determine how they use it and how much to use.

Q 3. Do we have any commons in the world today? Where?

A. Oil, gas, coal, air, water, minerals, soil, roads, and schools, etc. are all commons shared by many people. The natural resources are also shared with all future generations and if we destroy them, no other life will be able to use them.

Q 4. Do you think Dr. Hardin was right when he said, "We wall out people when we are in crowds?"

Students will probably disagree on this question, but the value, or lack of value, of being alone in a crowd should be discussed.

Q 5. What did the scenes with the girl singing "Everyone I See Has a Smile For Me" mean to you?

A. Possible answers: Modern advertising always paints a rose garden. We tend to view only the pretty aspects of life. Those with money ignor those without. Most people are happy, no matter how bad their life looks to others.

Q 6. Did you notice any new ideas about man's use of the commons?

A. The concept "A few people can abuse a commons and not hurt it, but many people will cause severe damage with much less per capita damage."

Q 7. What freedoms do you lose by living in a large city, instead of a farm? What freedoms are gained?

A. You better not skinny dip, build big fires, raise your own beef, drive down the center of a road, shoot cans with rifles, take long moonlight walks, or raise watermellons in the city.

You can go to more shows, larger schools, bigger stores, have better paying jobs, and be more selective of the types of friends you have in the cities.

Q 8. Should anyone be able to tell a farmer "Terrace your land to stop erosion, or we'll make you sell your land to someone else"? Should someone be able to tell you, "You can only have this much electricity this year. We must save our coal for future generations." Why do you answer as you do?

A. We hope that students will become aware of the need for all of us to use as little as possible of our worlds' resources so that life in the future will also have oil, gas, rich soil, and minerals.

Q 9. What causes people to feel differently about large cities and over population?

A. Living experiences; personal money, which provides more freedom; religion; etc.

Q 10. What solutions does this part of the film offer for problems raised during the first three parts?

A. It suggests that only through strong governmental efforts to control population growth will population growth stop on a permanent basis. Without governmental control, people with conscience will be eliminated by those with no conscience.

Q 11. Do you think we can have a maximum number of people and maximum good for all?

A. No, "You cannot have your cake and eat it too."

Q 12. How does nature control population?

A. Starvation, disease, sterility, war, and severe psychological strain.

Q 13. Should man control his own population? Why? How?

Students should be aware that the choice is either 1) control our population in a rational and fair manner; or 2) control over population in an irrational manner (for instance, everyone who can't afford food dies); or 3) continue to allow rapid growth, and keep death and disease at a minimum until shortages of one or many resources eventually causes a catastrophic population collapse.

Q 14. Why is population growth rate so important when world-wide nutrition is being discussed?

A. Good nutrition requires controlled population growth and good distribution of food supplies. Uncontrolled population growth causes poor nutrition, poor distribution of food, and the creation of more people unable to cope with their world.

Stretching the Dollar

This paper lists several suggestions which will help you get the best food for the least money. Articles and cook books which are free and could help you with purchases are listed in paper M.

1) The first and most important rule on wise shopping is - plan your purchases in advance. Make out a shopping list which will provide balanced meals for the week and stick to it. Grocery stores (and other stores) make much of their money from items which people pick up on impulse because they "look good."

2) Compare the prices of several grocery stores before picking the one you'll use. Make out a normal shopping list and spend one day going to several stores to compare their prices on canned goods, fresh fruits and vegetables, meats, and other things such as aspirin that are normally purchased in the grocery store. Chain stores are almost always cheaper than small local stores, and there are big differences between some chains.

3) Shop only once a week and alone. Friends will usually point out specials which you don't need, and every trip increases the number of things you will pick up because they look good, not because you need them.

4) Learn to recognize a bargain, and if it is something which stores well and you have the money and storage space, buy a large supply. However, everything that is advertised is not on sale. Many stores get rid of merchandise by advertising it as on sale, when it may really be more expensive than usual. A good idea is to make a list of things which you often buy, and write down their common prices and sizes so that you can easily compare the sales ads.

5) Try private brand merchandise and save about 10 percent. For instance, chain stores often have products with their own private labels that are cheaper than brand name products. In some cases, the same manufacturer produces both products.

6) As you shop, compare products which are not boldly displayed with those stacked at the aisle ends and at eye level. On the whole, stores will give the best displays to the products with better profits, while the cheaper products may not be advertised as well or displayed as openly.

7) Compare quantity and price. Many times, you will find that the biggest is not the cheapest by the pound. Shop at stores that provide you unit (cost per pound) prices so that products can be quickly compared. Ask stores that do not do this to start, and ask your congressman and state representatives and senators what they are doing to require large chain stores to post unit prices. (Small independent grocers would have a difficult time with this, but large chains can easily do it with computers).

8) Choose foods which require some work to cook them. Avoid convenience foods. You are bound to get either less quantity or poorer quality, in foods that have been prepared for you by the manufacturer. If he goes to the trouble to prepare your meal, then you'll pay him for his troubles.

9) Get some of the books listed in paper M and learn to use the cheaper sources of nutritious food. For instance, dried beans and peas supply excellent and cheap sources of protein. Bacon and lunch meat cost as much as sirloin steak when the food value is compared. Pop costs as much as milk, but supplies only calories.

To become a wise shopper requires some work. You must prepare, compare, stay alert, and plan to spend more time in the kitchen. If you're rich enough not to worry about this, then don't. Remember that wise shopping can cut a food budget in half. For a careful family of four, food can cost as low as $100 per month. For a family with poor buying habits, it can easily cost much, much more.

Student Self-Test

1) Which of these nine rules does your family usually not follow when grocery shopping?

2) If you were trying to save money, what rule would give the most important change to make in your family's buying practice?

3) Try to work with friends to determine the best food buys--for instance, comparing the weights of peas, pears, and corn contained in different cans with the cost of the can. You may be surprised at the best buys for these common foods.

Topics & Concepts

24. Given the costs and quantities of four foods consumed by an animal, students should be able to select the most economical food.

26. Students shall indicate that human foods should have accurate and usable information describing the nutritional value of the food displayed on the food package.

Suggestions for presenting Paper L:

One note on comparing stores: Some stores will offer low priced sale prices, but have consistently higher prices on other goods. Other stores will maintain generally low priced items. "Discount" stores may not really offer discounts. Only careful study can locate the best stores, and sale adds should always be consulted.

If your class decides to read this paper, a good follow-up activity would be to evaluate the grocery stores in your attendance area. To do this, have your class meet in four groups to draw up a standard shopping list. Have the groups make their list with these factors in mind:

1) How do prices compare between stores on brand name merchandise? (Miracle Whip, Hunts Catsup, Green Giant Peas, Jello, etc.)
2) What price ranges can be found on the same type of food? (Cheapest and most expensive cans of beans, pears, ground meat, flour, etc.)
3) Costs of the cheapest staples. (Milk, oranges, lettuce, ground beef, chicken, bread, soup, etc.)
4) When something is sold by number, what is its weight? (How much do five average heads of lettuce or a dozen oranges weigh?)
5) How can the list be written so that each student will check the same things? (Specify size of cans, bottles, etc.)

After the lists have been developed, compile a composite list as a class, and ditto it for all interested students.

Check results the following day.

Suggestions for Student Self-Test Questions

Q 1. Which of these nine rules does your family usually not follow when grocery shopping?

A. Rule 9 - Research and background study is done by very few families. All other rules are probably violated by all of us some of the time. Really encourage any of the students contemplating marriage in the next four years to try to get and study some of the suggested books and pamphlets.

Q 2. If you were trying to save money, what rule would give the most important change to make in your family's buying practices?

A. Ask the students to discuss this with their parents, and make a poll of the class reponses. Probably rules 1 and 3 would save the most money.

Stretching the Dollar - Resource Materials

This paper is for those of you who would like more information about purchasing cheap and nutritious food, planning balanced meals, or giving babies the proper care. It tells you where you can get useful information free.

The following materials can be obtained by calling or writing:

Mrs. Ann Bentemen, Topeka-Shawnee County Health Department,
1615 West 8th Street. Phone - 233-8961

Cook Books

A Collection of Recipes for a Limited Budget contains many recipes for preparing inexpensive meals.

Sack Lunches at School is a pamphlet with many suggestions for tasty, nutritious, and cheap sack lunches.

Cereals and Pasta in Family Meals is a pamphlet giving purchasing, storage, and recipe tips for using rice, grits, and pastas (such as spaghetti and macaroni) in meals.

Baby Care

They have a whole series of bulletins and pamphlets on the care and feeding of pregnant mothers and babies.

General Food Information

It All Depends on You! is a very good, condensed pamphlet on the different nutritional needs for all people, from age 3-70.

……

The following material can be obtained by writing or calling Mrs. Nancy B. Hoobler, Shawnee County Extension Service, Shawnee County Courthouse, Room 200, 200 East 7th Street, Topeka. Phone - 357-1241, Extension 448.

Cook Books

Money Saving Main Dishes is a good recipe book for inexpensive and nutritious main course dishes.

General Food Information

Your Money's Worth in Foods is a pamphlet which gives much help in planning a food budget, planning shopping lists, and purchasing the best food for your money.

Family Food Budgeting - gives excellent planning suggestions for family meal planning at different levels of cost.

Conserving the Nutritive Values in Foods, Home and Garden Bulletin No. 90, is a pamphlet which explains how to cook, can, freeze, and store food so that its vitamins and proteins remain as useful as possible.

Family Fare: A Guide to Good Nutrition, Home and Garden Bulletin No. 1, is a very complete bulletin which gives much information about nutrients and their proper preparation. Contains many good recipes.

Other Sources of Good Information

The Public Library has a magazine called Consumers Reports. It gives you the results and ratings of tests on all kinds of foods and other articles. Whether you are buying a new or used car or frozen french fries, the chances are pretty good that this magazine will help you find the cheapest brand with the best quality.

The Food And Drug Administration, United States Department of Health, Education, and Welfare, Washington, D. C., 20204, has many useful pamphlets and fact sheets on the many food additives, food standards, and job openings available to those interested in nutrition.

Better Business Bureau, Ramada Inn, Suite 24, 501 Jefferson, Topeka, Kansas 66605, has many useful pamphlets and fact sheets on how to purchase food, homes, insurance, cars, and most other things. They can help you avoid most of the consumer pitfalls which cost money and give no services. Write them or call 232-0454, for information.

This paper reinforces no basic concepts, but will suggest some good reference sources for interested students.

Encourage them to contact the people who can supply them with the information that looks interesting.

Point out that the Topeka-Shawnee County Health Department and the Shawnee County Extension Service both provide excellent help for people interested in food purchasing, clothing purchasing, health, and gardening problems.

Would You Use This Additive?

The additive proposal below is being studied right now by the Federal Food and Drug Administration. How would you decide it?

The Proposal

The F. D. A. is thinking of ordering the enrichment level of iron in all bakery products to be increased so that most women of child bearing age would be protected from anemia.

Reasons for the Proposal

1) Several scientists have studied the health and nutrition of different groups of Americans. They have found that almost 60% of the teenage mothers suffer some degree of iron-deficient anemia, and between 15-58% of the different groups of women throughout America suffer.

2) There is strong evidence to suggest that anemia plays a big role in poor school performance. From 8% to 64% of the different groups of one-year olds tested had anemia. Many researchers now believe that a combination of anemic mothers, anemic nursing mothers, and infant diets lacking iron, such as that found in liver, cause childhood anemia. In childhood, this anemia causes growth of less than the average number of brain cells. These cells will never be replaced. Anemic teenagers often show poor appetites, slowed growth, easy fatigue, and an inability to concentrate. In all studies, the poor of our country and throughout the world show the highest proportion of anemia.

3) There is evidence that the normal American diet has only one-half the iron needed by women, especially during pregnancy.

4) The amount of iron in our diet has dropped since we have started using aluminum, teflon, and stainless steel cooking pots instead of iron pots.

5) There is evidence that many of the products sold as iron supplements do not have iron in a form usable by the body.

6) There is evidence that most Americans do not eat foods with high iron content.

7) There is evidence that normal persons do not absorb more iron than they need, no matter how much is eaten.

8) There is evidence that breads can have iron added without hurting the appearance, taste, or cost of the product.

Arguments Against the Proposal

1) About 0.01% of our population may have a disease called hemochromatosis, which will be activated with excess iron in the diet.

2) Men, which now have adequate amounts of iron, will eat much more than they need. There is no proof that all of this excess iron may not hurt some part of the population. The only way to really get the proof is to put iron out in extra quantities and watch medical records.

3) We should enforce laws dealing with truth in advertising. If someone claims to have a product which provides iron to the body, make him prove that the iron is really in a usable form, and advertise the amount with the product.

4) More education would encourage more women to eat the liver and leafy vegetables which supply iron naturally, rather than add iron additives to our breads.

If you were the Federal Food and Drug Administration, would you order the addition of iron to bread? Why, or why not?

TOPICS AND CONCEPTS

25) Students shall indicate that good nutrition is most critical during growth and pregnancy.

SUGGESTIONS FOR PRESENTING PAPER N

Encourage a good class discussion of this paper by asking the class to break up in groups of four students for a five-minute discussion of the paper. Then have each group give its report to the class, with opportunities in the class to question the group's reasoning.

This paper was written to force students to look at the additive problem as the Federal Food and Drug Administration must--every additive has advantages and risks. A good class discussion should bring out this point.

Diet Schemes - Fact and Fiction

Many Americans are, or will become, overweight. Overweight people get fewer promotions, pay higher life insurance premiums, and die younger. Therefore, the field of quack diets and reducing gimmicks is a multi-million dollar business that preys on millions of overweight Americans. This paper will outline a few easy checks which may save you or a friend money and health someday.

Lose Lots of Pounds in Days

Any advertisement that offers you the possibility of losing more than about three pounds a week (12 pounds a month) should be thrown away. One pound of body fat contains enough calories to keep a normal person working at a normal pace for one day. If a person did nothing but drink water for a week, he would burn up only about seven pounds of fat if he did his normal work. However, without some continuous nutrient intake, he would be getting sick by the end of that time. To stay healthy and active, the body must have a daily dosage of minerals, vitamins, proteins, fats, and carbohydrates. About 1000 calories are needed to supply these nutrients if the diet is planned carefully. Therefore, a safe weight loss cannot be a pound a day, but only about one-third to one-half pound a day, or at most, three pounds a week. Advertisements such as those which offer weight losses of thirty-five pounds in two weeks (or even a month) are obviously for quack cures, but they still continue to attract thousands of overweight people.

Can Anything Speed Up Your Body's Metabolism?

Most advertisements indicate that they have discovered a new drug, food, electrical stimulator, or weight belt that will strip pounds off the body. Usually this claim is accompanied by a reference to a doctor who is an "expert in his field."

In fact, there has never been anyone who has published research which proves that anything can safely speed up your metabolic rate for more than short periods of time. A few drugs requiring a doctor's prescription and supervision can temporarily speed up your heart and increase the rate of energy consumption, but these are dangerous, cannot be safely taken for very long, and are not prescribed to help reducing. Claims that weight belts and electrical stimulators can strip away inches are also false. Weight belts can reduce circulation to the legs and feet and may cause physical damage. Electrical stimulators can easily cause damage to the heart and other body organs. Both the belts and the stimulators can temporarily tone up muscles and have reduced measurements for some people. However, neither device speeds reducing and the temporary effects stop as soon as exercising stops. The same effects could be achieved by exercising without the devices.

But It's Guaranteed!

The Better Business Bureau reports that diet quacks almost always offer a guaranteed and complete refund of the purchase price if the customer is not satisfied. However, the facts make this guarantee worthless. Some companies take the money and don't even bother to send any merchandise. Most send the merchandise, but refuse to refund the money. A standard procedure is for a man to open a business, advertise very heavily for two to three months, send out his product to thousands of customers go out of business when the first complaints arrive, and move to a new state to start over again. Governmental action always seems to be about one year too slow.

Only I Know The Secret

The final give away for a quack is the indication that only the company offering the product has found the secret - whatever it is. Keep this idea in mind when you read any advertisement. If the material had any proven scientific merit, the company would have patented the idea, and would be selling through doctors throughout the United States. The fact that the company is advertising through newspapers, radio, and TV offers a strong indication that they do not plan to keep their address in one place long enough to provide the help to Americans that their advertisements promise.

What Should You Do?

Face the fact that losing weight is going to take time and it is going to be hard. Probably the best way to lose safely would be to join a club such as TOPS or Weight Watchers. These clubs will provide carefully balanced diets, and the group support that is very important for succeeding at such a long, hard job. Better yet, watch your weight carefully throughout your life.

Beware of anyone that suggests that weight loss is easy, and call your Better Business Bureau before sending any money for anything that looks like it can make weight loss fast or easy. Finally, if you receive anything in the mail that you did not ask to buy, remember that our laws do not require you to pay for it. If someone starts billing you for something that was not ordered, call your Better Business Bureau.

Student Self-Test

1) List four claims that should cause you to suspect a qua[illegible] diet scheme.

2) Can you find an advertisement in a paper or magazine that is probably for a quack diet?

Topics & Concepts

11. Students shall be able to select the best definition of malnutrition.

12. Students should try to keep their daily diets nutritionally balanced.

15. Students shall indicate that nutritionally balanced diets cannot be made from a single food source.

Teacher Suggestions for Paper O

This paper could provide an interesting discussion, since most students will know someone who is, or has been, on a diet of questionable value. Be sure to point out that overweight is the most common malnutrition in the United States.

The Better Business Bureau will give a class presentation on consumer issues, quack diets, credit schemes, or tips for teenagers in the market place. You may wish to call them when presenting this paper.

Answers - Student Self-Test Questions

Q 1. List four claims that should cause you to suspect a quack diet scheme.

A.
- a) Promise of large weight losses in a short time.
- b) Promise of effortless weight loss.
- c) Indications that the product causes your body to quickly use up excess fat chemically, or in any other fashion.
- d) Offers of guarantee to things that look too good to be true.
- e) Indications that only the company has the secret fat remover, or that some "expert" has figured out a new cure.
- f) Testimonials from important sounding people, such as politicians and generals.
- g) Any diet with very few foods. This diet could not supply all nutrients.

Q 2. Can you find an advertisement in a paper or magazine that is probably for a quack diet?

A. By checking a variety of local papers and magazines (particularly the romance magazines) a collection of quack advertisements can quickly be accumulated.

The Fat Fighters

The film "The Fat Fighters" looks at the unpleasant realities of the reasons for being overweight. It follows a group of overweight women who attempt to deal with their obesity, while not always succeeding.

Student Self-Test Questions

1. Why is group support necessary for most people who need to lose weight.
2. What are some reasons that reducing is so hard for people that are badly overweight?

Topics & Concepts

11. Students should be able to select the best definition of malnutrition.

12. Students should try to keep their daily diets nutritionally balanced.

Suggestions for Presenting the Film

This film is, frankly, a hard film to handle well in class discussion. An untactful or inconsiderate member of the class could easily ruin the day for an overweight classmate.

The film should be introduced with the comment that some of us will become overweight. Most students will have an overweight relative or friend. The film will show some of the reasons for the continued failure of "diets" to do the job. It is a complex problem, and supportive, rather than critical comments from friends are more likely to help the person lose weight.

Answers - Student Self-Test Questions

Q 1. Why is group support necessary for most people to lose weight?

A. To lose weight, behavior must change, and this is a very hard, slow process. Many excuses can be offered, and other people with the same problem are the most effective "excuse exposers" and "success supporters".

Q 2. What are some reasons that reducing is so hard for people that are badly overweight?

A. Habit, low self esteem, pressures from others not overweight to eat, few incentives, and the physical difficulty of being hungry and needing to continue functioning normally in work or at school.

Have a Healthy Baby

The film "Have a Healthy Baby" shows many of the actions which a family can take to insure a healthy baby. If you ever intend to help create a child (and you probably will someday), you should watch this film carefully.

Student Self-Test Questions

1. What are three things that can influence the health of a baby?
2. How do chemicals such as nutrients and drugs get into the baby when its blood vessels are not directly connected to the mother's?
3. What month is the most crucial in a baby's life?

Topics & Concepts

8. Students shall indicate that, during pregnancy, the mother needs to eat slightly more from each of the fruit and fresh vegetable, milk, & meat groups.

12. Students should try to keep their daily diets nutritionally balanced.

25. Students shall indicate that good nutrition is most critical during growth and pregnancy.

28. Students shall indicate that low levels of minerals and proteins most frequently cause humans permanent mental and physical damage.

32. Students should indicate that society should work to supply nutritious food at a price which each family can afford.

Suggestions for Presenting Paper Q

This film has been previewed and can be shown in your classroom without parent approval.

Home economics classes may use this film during the year, but most students will not have seen this film, and all should see it.

These questions could serve as good follow-up questions for the film and this module:

Q 1. What happens if the mother does not eat enough of the proper foods during pregnancy?

A. Both the baby and mother will suffer. A common misconception is that the baby will somehow pull all of the calcium, iron, etc. from the mother, and only the mother will be hurt. This is not true. The chemical content of the mother's and baby's blood will be very similar. Because the growing baby has greater needs, his growth will be stunted if adequate supplies of all nutrients are not available.

Q 2. Why should any girl or woman maintain a nutritious diet?

A. The most critical part of the baby's life will be over before a girl knows she is pregnant.

Q 3. Of what foods should a pregnant mother eat larger than normal quantities?

A. Only foods from the meat, milk, and fruit and fresh vegetable group, and only one helping more than normal of these foods.

Q 4. What nutrients are critically important to the growing baby?

A. Proteins, calcium, and iron. These nutrients are also most likely to be deficient throughout the United States and the world.

Answers - Students Self-Test Questions

Q 1. What are three things that can influence the health of a baby?

A. Drugs, disease, and poor nutrition of the mother most commonly hurt the health of the baby. You should point out that large excesses of vitamins A & D can cause damage, as can too little calcium or iron.

Q 1. How do chemicals such as nutrients and drugs get into the baby when its blood vessels are not directly connected to the mother's?

A. Chemicals such as oxygen, food, CO_2, wastes, and occasionally cells pass through the mother's thin blood vessels and into the baby's system. Most damage is done by these chemicals.

Q 3. What month is the most crucial in a baby's life?

A. The first, before the mother even knows she's pregnant. That is one reason the mother's overall health is so important.

The Animals are Crying

The film "The Animals are Crying" describes the responsibilities and benefits that occur with owning pets. It examines the abuse of pets by many pet owners, and describes the work of the Humane Society.

Student Self-Test Questions

1. Is the attitude "a pet is just a thing to be purchased and thrown away" a common attitude? Do people with this attitude feel the same toward human life?

2. What laws should cities make and enforce to control the pet explosion? Be sure to apply any proposed laws to your own pets!

Topics & Concepts

No tested topics and concepts are directly enforced by the viewing of this film. However, the overall content of the film reinforces the general thrust of much of the entire unit.

Suggestions for Presenting Paper R

This film makes a blunt appeal for the spaying of all female pets as soon as all wanted litters of young are born, and for the responsible care of pets from youth through old age.

Two segments of the film may turn some students stomachs. One shows cats and dogs being put to sleep, and one shows the spaying of a dog. You may wish to provide outlets for a minute or so for squeamish students.

A good discussion question would be - do you treat your pets in a manner which will eventually cause them to be put to sleep? Do you think that pet owners who do not take care of their pets should have the responsibility for personally killing them? It is all to easy to let someone else clean up your mistakes.

Answers - Student Self-Test Questions

Q 1. Is the attitude "a pet is just a thing to be bought and thrown away" a common attitude? Do people with this attitude feel the same toward human life?

A. Most of the students will know someone with no regard for pets lives. Have students consider whether actions of those people indicate a similiar attitude toward human life. As a discussion stimulator, you might point out that many of the world's dictators have had dogs such as setters which are quite docile, but could not stand to own cats, which tend to be quite independent.

Q 2. What laws should cities make and enforce to control the pet explosion? Be sure to apply any proposed laws to your pets!

A. Let students suggest and discuss a variety of laws. A provocative law which may stimulate discussion would be: Any pet not confined by leash or pen, shall be neutered. Owners may reclaim after paying for the cost of the operation and any ensuing housing expenses.

The Field Trip

Topics & Concepts

Behavioral objectives 4-30, and 32-33 will all be reviewed during the trip, as guides follow the directions contained in this paper.

The following objectives are for new concepts introduced only during the trip.

34. Students shall be able to select the most important step in accurately determining the nutrients in a food.

35. Students shall be able to apply the fact - bacteria which thrive at high temperatures may not be killed during canning - to a specific problem.

36. Students shall indicate that, when stored properly, canned food will remain usable for more than a year.

37. Students shall indicate that Theracon's animals are treated pretty well, except when their research might be testing a poor diet.

Using the "Request to Principal for Field Trip" form.

Three copies of this form must be submitted for each field trip. They should be submitted as early as possible and at least one week prior to the trip. You may use the form on Page S-2 in either of two ways: duplicate it the proper number of times, fill in the required information, and turn in to your principal; or obtain the proper number of request forms from your principal and transfer this information to it.

Please invite your principals to attend this trip with you. It will provide them a much better picture of the value of field trips than could be conveyed in any number of words.

Using the "Parental Permission" forms.

Strongly urge your students to have their parents read and sign these sheets. They are quite important to the continued success of this project and in establishing some communication from you to the parents. We need the volunteers that are occasionally picked up with this form, and the community should be aware of what the project and its teachers are doing with their students. We also need the emergency phone numbers in case a student should be hurt.

Have the class fill out the first three blank lines before sending the forms home. Please bring the forms with you when boarding the bus.

THE TOPEKA PUBLIC SCHOOLS
REQUEST TO PRINCIPAL FOR FIELD TRIP
SECONDARY SCHOOLS

Community resources are valuable aids to the instructional program. Careful planning and proper follow-up are necessary in order to make the trip most worthwhile. This form should be properly completed in TRIPLICATE and signed by the teacher and principal. The original copy is filed in the principal's office. The principal shall send duplicates to the office of instruction and departmental supervisor.

School__________ Department__________ Subject and Class__________

Date of Trip__________ Leave______ Return______ Number of Pupils__________

Description of Trip The class will travel to the Theracon, Inc. laboratory for a two hour field trip. Students will work with a trained adult guide in teams of ten or fewer students.

Objectives of the Trip To further develop concepts introduced during the 10 hour pre-trip study of nutrition and its interaction with the human environment. The teams will observe the processes and products of a modern research laboratory doing nutritional studies on a variety of animals.

Means of Transportation Environmental Education bus.

Required Student Cost None

Teacher Signature____________________ Date__________

= =

I approve the above request and accept the responsibility for the field trip as stated in the guidelines on the reverse side.

Principal's Signature____________________ Date__________

Module: 4

The Topeka Public and Parochial Schools
Unified School District No. 501
Environmental Education Demonstration Project
Phone: 232-9374

The____________________school science students in________________________class will be participating in a two-hour field trip to study the Theracon Laboratory on______________________________. For the past two weeks, the class has been studying nutrition, and the research methods used at Theracon. Transportation and volunteer leaders for the trip will be supplied by the federally funded Environmental Education Project.

If you give______________________________permission to take this trip, please answer the following questions, and give your signature below.

____
Signature of Parent

Emergency Information:

Home Phone_______________

Alternate Phone______________

Doctor's Name__________________________

Doctor's Phone____________________

- -

The Environmental Education Project takes students from all over Topeka on many different kinds of field trips. If you would be interested in being trained to serve as a volunteer to lead students on any of our trips, please indicate your interests below. You would be trained for any trip before being put in charge of a small group of students. You are also welcome to visit any trip. Please call the Environmental Education Office, 232-9374, during the day if you wish to visit any of our trips.

With training, I could help lead a field trip. ☐ Yes ☐ No

I would like to work with: Sixth Graders ☐ Junior High ☐ Senior High ☐

I would like to help on these types of trips:

Museums ☐ Nature Study ☐ Water Study ☐
Geology ☐ Industry ☐ Laboratories ☐

Name___________________________________

Address___________________________________

Phone No.___________________________________

Planning for the Substitute: The substitute provided by our project is able to present paper I, J, L, M, N, O, P, Q, R, or T. She should not be expected to handle the film, Tragedy of the Commons and paper K easily, since good knowledge of the students in the class is required to make this discussion profitable.

Provide the substitute with lesson plans for each class which would allow her to present meaningful and interesting material.

Notify both the substitute and the students of the various discipline tools at her disposal, for many classes prefer to harass rather than learn from a substitute.

Pre-trip Lecture Suggestions.

1. Remind students where they will meet the bus and the time for departure and return to the school.

2. Students will be outside for up to 15 minutes of the trip, so they should have appropriate clothing and shoes.

3. Behavior during the trip: a) Groups will be selected at random by the Environmental Education staff. This is to provide a good mixture of all types of students and interests in each group. In a mixed group, all members can share and learn more. b) The trip is an intensive learning experience, so come prepared to work and learn. c) Each group is to remain under the supervision of one guide for the entire trip. d) We will be guests of the Theracon Laboratory, so act like guests. e) If a student cannot cooperate and work with other students and the guides, please tell the teacher now, and stay home. One disruptive student can damage the learning and appreciation of the trip for every other student in the group.

4 Ask students to eat a nutritious meal before all trips. Students with inadequate meals tire out quickly, and grumbling stomachs provide strong competition for constructive learning.

5. Smoking is not allowed on the bus (state law, flammable seats, and close quarters dictate this) or on the trip.

6. Ask students to think of some questions about nutrition, pets, laboratories, and such for the guides to answer during the trip.

Field Trip Schedule	A	B	C
Load students at school	8:20-8:25	10:25-10:30	1:05-1:15
Travel to Theracon	8:25-8:45	10:30-10:50	1:15-1:35
Unload and assign groups	8:45-8:50	10:50-10:55	1:35-1:40
Study Theracon	8:50-9:55	10:55-12:00	1:40-2:45
Review the Trip	9:55-10:05	12:00-12:10	2:45-2:55
Return to the classroom	10:05-10:25	12:10-12:25	2:55-3:10

Directions for Trip Guides

The field trip for each group will be unique. The class will be divided (arbitrarily) into groups of ten students or less. Each group will have a different leader and a different route, but all will try to meet the same basic goals.

These suggestions should help make the field trip as profitable as possible.

1. Learn the students' names as quickly as possible, and call them by name throughout the trip.
2. Vary your topics and pace.
3. Don't talk to the group until all can hear and see what is being discussed.
4. Frequently ask a question, let students think awhile, then pick a specific student (on a semi-rotating basis) to answer the question. Keep questions moving and random enough that students never know who may be called upon next.

The list which follows describes the activities, allotted times, and suggested topics to be discussed at each point on the trip circuit.

The Meeting Room (15 minutes)

Samples of fats, proteins, carbohydrates, vitamins, and minerals are available for discussion. Use these questions and directions to guide your discussion.

Basic questions to introduce the nutrients:

1. Name a nutrient.
2. What does this nutrient do for you?
3. What foods have lots of this nutrient?
4. What nutrients are most likely to be deficient in human diets? (Proteins and minerals--particularly calcium and iron.)

Ask each student to taste protein, and review these topics as they taste it.

1. Proteins are found in the milk and meat group.
2. Proteins should not be used for energy, but for building body cells, etc.
3. A pregnant mother should eat one extra helping of the milk and meat groups.
4. List three cheap sources of protein (beans, peas, peanut butter).
5. Why should these proteins provide no more than 80 percent of the total protein eaten? (They lack some of the amino acids which can be supplied by small amounts of egg, meat, or milk.)
6. The protein being tasted in Casein--a protein from milk.

Ask each student to taste carbohydrates, and review these topics:

1. Carbohydrates are found in cereals and breads.
2. Carbohydrates provide calories which can quickly be digested and used by the body.
3. Pregnant mothers should not eat any extra servings of carbohydrates.
4. All animals need some carbohydates to avoid needing to burn proteins for energy.
5. This carbohydrate is flour--name some foods which contain carbohydrates. (Bread, rolls, apples, potatoes, etc.)

Ask each student to taste vitamins and review these topics:

1. How do vitamins help the body? (In a wide variety of ways--all of which could be classified as assisting cells.)

   Vitamin A helps keep mucous membranes and eyes healthy (yellow vegetables).
   The B vitamins help release energy from food (milk and meat).
   Vitamin C helps cement cell walls together (fruits and vegetables).
   Vitamin D helps the body absorb and use calcium (sunlight on skin, and milk).

2. Vitamins do not give energy, and no conclusive evidence has shown that excess vitamins help any health problems. Excess vitamins A and D can definitely cause health problems.

3. Vitamins are quite expensive ($1,000/pound in some cases) when purified. The vitamins being tasted have been cut (mixed) with sugar to make them go further.

Students should not taste minerals. Review these topics:

1. Minerals taste like dirt--because dirt contains many minerals.
2. Minerals are poisonous in large quantities. Kids have died from eating large quantities of their mother's iron pills.
3. What are some minerals? (Iron, calcium, magnesium, copper, cobalt, iodine, etc.)
4. What foods supply minerals?
   Calcium (sounds like cow) comes from the milk group.
   Iron (in blood cells) comes from meat group--including beans, peas, and peanuts.
   Trace minerals (copper, cobalt, iodine, etc.) come from vegetables and fruits.
5. Minerals assist cell activities--iron carries oxygen, iodine in thyroxine helps regulate processes throughout the body, calcium is essential for proper nerve functioning. Too often, people think of minerals as just making bones. This is but one function of minerals.

Students should not taste the fats and oils. Review these topics:

1. Pure fat or oil does not taste too good, and without the addition of anti-oxidants (which inhibit mold) the lard quickly becomes rancid.
2. Incidently--what do we buy that has anti-oxidants (mold inhibitors) added? Crisco, cake mix, pancake mix, bread, jelly, ham, weiners, bologna, etc.
3. Fats and carbohydrates should supply most of your energy.
4. Fats have twice as much stored energy as sugar, which is a carbohydrate (ie. one pound of fat has twice as much stored energy as sugar).
5. Fats are also essential for pulling the fat soluble vitamins (A and D) out of the intestine and into the blood stream.
6. What foods are high in fats? (milk and meat group)

Review questions:

1. What nutrients are found in the highest quantities in the:
   Milk group: calcium, protein, fat, and B vitamins. Vitamins A and D are usually added.
   Meat group: iron, protein, fat, B vitamins.
   Fruit and fresh vegetable group: vitamin C, A, and some minerals (copper, iodine, zinc, etc.)
   Cereals: carbohydrates, primarily.

Pass out samples of prescription diets, science diets, commercial diets, and zoo diets. Review these topics:

1. Theracon contracts to do research with many companies.
2. Have students examine the labels of the foods and discuss these diets:
   a. ID (intestinal diet) is made of very soft foods and is low in fiber for dogs with intestinal problems and recovering from surgery. Define fiber and ask why it should be low in these foods.
   b. KD (kidney diet) has very good proteins in low levels so that protein is not burned for energy which would force the kidneys to remove urea from the blood. One third of our dogs die from kidney disease, and high protein diets are one cause of this.
   c. HD (heart diet) has very low levels of salt, which helps stimulate heart attacks. If we could feed a diet like HD to people with bad hearts, they could live much longer.
   d. RD (reducing diet) is high in fiber, and low in fat. Ask two questions - Why is fiber added? (It keeps the system feeling full without giving off calories.) Why must some fat be kept in the reducing diet? (It is essential for carrying vitamins and maintaining a healthy skin.)
   e. Science diets are guaranteed to be nutritionally complete and made of the same foods this year or ten years from now. They are used to feed research animals.
   f. Orphalac is a milk for orphaned puppies. Be sure to stress that human babies, like puppies, need much more than cow's milk to be healthy. Many low income families switch babies from foods such as Similac or Enfamil (like Orphalac for humans) to milk, or even powdered milk diets. This is a bad policy, since it deprives the child of needed minerals, vitamins, and the proper combinations of nutrients.
   g. Science diets, zoo diets, and prescription diets are all nutritionally complete, and their ingredients are always the same, unless new research indicates that a new trace mineral or vitamin should be added for the health of the animal.
   h. Commercial diets change as the market changes. The "Ingredients" label lists all things that might be in the food, but not their quantities (which may be zero). This is why pets may eat a food one day, but not the next when a new can or sack is opened.
   i. All canned diets are about 3/4 water, 1/4 food.
   j. Discuss the information which should be on labels of human foods. (Ingredients, indications of protein quality, and well-explained nutritional content.)
3. In summary, guaranteed analysis labels and lists of food ingredients can give an indication of the food quality, but the term "nutritionally complete" means much more under present laws.

Use the slides to develop these points.

Any animal on a low calcium - high phosphorus (or high vitamin D) diet may develop symptoms displayed by the horses. Mothers with too much vitamin D or too little calcium may bear deformed children. Dogs eating only meat, people eating only cereal or anybody eating "only" anything is likely to develop severe nutritional deficiencies. Most results aren't this dramatic, and in adults they are most likely to show up as increasingly bad health problems as old age approaches. During pregnancy and growth is where poor nutrition will most quickly bring poor health.

Processing Room (7 minutes)

Review the machinery in the room and use the samples of four types of food to discuss these topics.

1. Why does Theracon need food processing equipment? Because they must be able to show manufacturers how to make nutrious and palatable diets. To do this, they must be able to make and test small amounts of the diet.
2. Canned food is sealed in a can, then cooked under pressure. As it cooks, many vitamins are lost, so excess vitamins must be added to provide the correct levels after cooking. Canned food is more palatable than the others, but is 3/4 water.
3. Semi-moist food (prepared for Theracon in a plant in Seneca) has steam blown into the food which causes the food to expand and be sterilized. This food is fairly palatable, and 20-25 percent water. It takes good research to make it because not all ingredients will blend and hold together.
4. Dry food is put under high pressure and squeezed through small holes. It contains less than 20 percent water. This also requires some good research to develop a palatable food which will hold together.
5. What does palatable mean? (good tasting) How would you test for palatable food? (place two foods side by side and see which is eaten)
6. How should foods be stored? Always keep them dry and cool.
7. Why should canned foods be kept cool? Some bacteria grow only at high temperatures. These may not be killed during canning and will start growing when food is stored above 90° F. This can be a real problem in warehouses during the summer or in food stored near hot water heaters or furnaces. Never use a bulging can of food.
8. Canned food can be stored over a year if kept dry and below 90° F. Semi-moist and dry food slowly crumbles and should not be stored more than six months.
9. Canned food usually costs about 25 cents per pound. If dried food also costs 25 cents per pound and is equally nutritious, and palatable, which would be the least expensive to buy? Dried food, by far. In this case dried food would be less expensive if it cost 75 cents per pound, since it contains three times as much food per pound as canned food.
10. Why is water in food? It makes it more palatable, and it is the most important chemical in every plant and animal body. You'll always find it in any food you eat, and you need large quantities every day.
11. Point out the Ultra High Temperature Short Time Processing unit which is used to make liquid diets. Use this to illustrate the point that Theracon is a research business, and they must predict the needs of their customers. Several years ago they bought this very expensive equipment because they thought there would be a market for many liquid diets. They've only been asked to develop three diets and the equipment just sits awaiting a new diet some day.
12. Ask the students to name the types of additives which would probably be found in artificial milk, such as Orphalac.
    (Emulsifiers - to keep everything suspended and mixed.
    Nutrient Additives - All nutrients in artificial food would fit this classification.
    Flavoring additives - to make it palatable.
    Coloring Additives - to make the human think it looked like milk.)

Visit the cold room. Point out these things:

1. There is a wide variety of meats stored (examine several).
2. Show the tiger food.
3. Point out the drugs stored in the cool room.

Move back to warmth to discuss the following topics:

1. A wide variety of meats are used in making diets for three reasons.
    a. Mixing several proteins makes a good mixture of amino acids more likely. (Discuss amino acids and the fact that every food has a different mixture of amino acids.) The goal of Theracon is to provide all the amino acids needed by the animal at the lowest price.
    b. Animals can digest and use different foods to different degrees. The only way to determine what can be digested is to feed the food and analyze the animals' wastes. Human hair, for instance, would be the perfect protein for humans, but we can't digest it. The same thing goes for other foods with much protein.
    c. Theracon must prepare diets with several different possible combinations of ingredients for commercial foods. Then as the price of chicken, horsemeat, and other ingredients rises and falls, the manufacturers can switch diets and maintain quality. This requires testing many kinds of foods.
2. Theracon tests many drugs and sees how they affect the way animals use their food. Any drug may affect the animal's digestion and ability to use different nutrients. (As an extreme example - if a drug killed all of the bacteria living in the human intestine, we would need to add several vitamins to our diet. The bacteria produce the vitamins for us free of charge, so to speak.)

Storage room. (5 minutes)

As you examine different foods, chemicals, and ingredients for foods, develop these concepts:

1. Animal and human foods must be developed in many forms and with many things in mind. (ie. Tiger meat was frozen because zoo keepers didn't like the idea of tigers eating soft food - tigers didn't care. Marmoset monkeys need small pellets that can be popped in their mouths 50 at a time and chewed one at a time. House cats like food with a "crunchy" texture. Dogs like sugar, crocodiles like food that floats. People who like garlic think that garlic flavored pet food must be the best, and so on.)
2. Theracon has to consider both the likes of the animal and of the owner in developing diets. (Dogs are color blind, but red iron oxide is added so that the owner will see a nice red color.)
3. Cultural hang ups are stopping human nutritionists from helping solve some of the world food problems. For instance, many Indians will not eat wheat because it isn't rice. It's hard to talk someone into trying powdered milk or soy flour if it doesn't taste just like their other foods. This has really been a problem as new high protein foods are developed. These frequently cost more and look or taste "funny." If students think this is "stupid" of other people, offer them a piece of dog food or a monkey biscuit. Both are more nutritious and cheaper than cokes and hot dogs.
4. Cereals (find a container of starch) are added to dog food so that the protein can be used for building the body, not supplying energy.

5. Trace minerals (use a container of zinc sulfate with the skull and crossbones as an example) are extremely important in the diet, but required in very low levels. "Scan" diets which are made of very pure nutrients to determine the trace mineral requirements of animals. Two good examples of this are:

   a. Thoroughbred race horses have often had severe leg problems which used to be blamed on in-breeding. Theracon used a "Scan" diet to discover that the horses suffered from lack of zinc in their diets.
   b. Cows eating rapidly growing grass can become very sick and die within just a few days from Grass Tetany. This is caused by low levels of energy (not enough carbohydrate in the young grass) and deficiency in magnesium. This is becoming more and more of a problem as farmers plant new strains of rapidly growing grasses. Without magnesium, many cell activities are suddenly and seriously disrupted.

Record Room (5 minutes)

Point out the pans prepared for palatability tests, the charts showing the dogs in pens, the foods stored below shelves, and the charts for blood tests etc.

1. Careful records are kept on every dog - this is why the dogs are worth $125 or more apiece to Theracon, although they would be worth nothing to most people. Theracon knows the history of the parents, grandparents, and many generations beyond. One strain of Theracon dogs has high cholesterol levels in the blood and is used for heart research. Another strain has glands which swell up around the eyes.
2. The most important use of the animals is during pregnancy and puppyhood. Then they will quickly show symptoms of poor nutrition. After reaching full growth, most dogs and cats are sold to other groups doing research.
3. The amount and kinds of food eaten by the animals is recorded every day, and blood tests are run at crucial times during pregnancy, puppyhood, and whenever a new diet is started and finished. This allows Theracon to accurately measure the nutrients which are getting into the dogs' blood streams.
4. Palatability testing (have students define and explain) is a very important function of this room. No matter how nutritious the food, if the animal won't eat it, it won't sell.
5. Small dogs and cats are particularly hard to please with a palatable diet. Both may fixate on only one kind of food (in one case, a dog ate only chicken fried steaks) and will starve to death before they will switch to a different, more nutritious food. Palatability is of particular concern to veterinarians who need to prescribe a prescription diet to sick and finicky animals.

Background information: Most dogs are sold when one year old for about $125. The University of Missouri buys high cholesterol dogs. The American Museum buys all very old dogs and cats. Kansas State and many other researchers buy the rest.

Metabolic Cage House: (5 minutes)

This room is where very exact nutritional testing is done. Animals are penned in a room where the temperature is very carefully controlled. All feces and urine are collected. All nutrients going into and coming out of the animal are analyzed so that the quality of the food can be determined.

Review these concepts:

1. Digestibility is determined by dividing the amount of food that goes into the animal into the amount of food going out. If you fed 10 pounds of dog food and collected 5 pounds of wastes, what would the digestibility be? (50%-of course we're talking about dry matter, not wet matter comparisons, but this need not be discussed.)
2. Theracon is interested in how much of the minerals, vitamins, proteins, carbohydrates, and fats put into the food make it into the animal. (Use this opportunity to briefly review via questions the foods which provide these nutrients to humans.)
3. Pregnant females or young puppies would be preferred for these tests, since they would give the clearest indication of food quality.
4. We may never know all of the nutritional requirements of people, because pregnant women and young babies are not too happy about submitting to a prolonged test in a metabolic room. The closest thing we have to this is the astronauts who are in their own metabolic cage.
5. Ask students if they would rather eat a 0%, 80%, or 100% digestible diet. Point out that they would starve on the 0%, have no bowel movements at 100%, and be in pretty good internal shape at 80%.
6. Point out that Theracon has to use the metabolic cages to accurately measure the value of food; that animals are kept in them as little as possible; that the same animal is never used twice; and that older animals are used in most cases, since their digestive system works pretty much like their young. Theracon does not want to make young animals submit to the cages if it can do the job with older animals.
7. Have students define proper nutrition: Make sure that the idea of eating the right foods to maintain the best health for the longest time is contained in the response.
8. Use this question as though it was an after thought. Why can't people grow a lot more food so that no one in the world need starve? Answer - We're farming nearly all available land. More farming than now done will only increase the speed of erosion, which will come back to hurt us in later years.

Dog Pens (10 minutes) (Caution Students about losing fingers to German Shepherds!)

The outdoor dog pens are arranged in four basic groupings. Group pens with several grown dogs are usually for animals on maintenance diets staying healthy between experiments. Pens with young puppies (& occasionally the bitches) are using blood tests, weight charts, and visual examinations to make sure that diets are working as planned. Pens with single dogs are running palatability tests. Notice that a variety of ages and physical conditions are present in these pens. Large pens with concrete runs are used for checking to see if diets cause diarrhea and to collect the feces of the large dogs for analysis.

Review and Introduce these Concepts:

1. The concrete slab pens are used to see if foods cause diarrhea.
2. Beagles are used for most testing because they're medium sized, intelligent, and even tempered.

3. The German Shepherds are used because they are becoming very common and are frequently under high stress. They require a different diet with more energy than used with the Beagles.
4. Theracon also does occasional work with other large dogs, such as Great Danes. These dogs grow so fast that they will frequently have nutritional deficiencies. To compound the problem, owners try to buy inexpensive food which may not be nutritionally complete. Theracon makes sure that every diet has enough calcium and energy to satisfy the animals.
5. All animals are housed outside when possible, because they remain much healthier (even when it is 0° F). Their houses are insulated, their fur coats grow thick, and the wind and sun destroy and disperse most diseases. Ask students which nutrients keep the dogs warm by providing energy (carbohydrates and fats).

Food Testing Laboratory (10 minutes)

Point out and explain these tests and their instruments:

1. All food and feces are carefully weighed and dried in drying ovens. This determines water content and is a most important step, because the nutritional content of canned food (75% water), urine (99% water), and dried food (10% water) could not be compared without prior drying. Note: Ask the laboratory technician if you can open the drying oven and ashing oven before doing so. You may get some very unpleasant results by opening at the wrong times!
2. The dried food is ground-up in a blender.
3. Part of it is burned until only ashes remain (open the oven if possible). Ask students what nutrients will remain in the ash minerals. Have them name 4 minerals (calcium, iron, copper, zinc, iodine, etc.). Have them give foods containing calcium (milk group-name several foods) and iron (meats, beans, eggs, peanuts, and peas).
4. Part of the food is digested in acid to measure the protein content. Ask what acids are contained in proteins. Have students name some high protein foods.
5. Part of the food is digested in acids and bases, and the indigestible fibers are measured. Ask students why fibers are useful to the animal. (They help keep the intestine running correctly). Have students name some foods high and low in fiber (Lettuce, carrots and celery, etc. are high. Milk, cheese, and cokes are quite low).
6. Part of the food has ether dripped over it and the fat is extracted and measured. Ask students to name 3 ways that fat helps the body (energy, vitamin "towing", and skin conditioning).
7. The calorimeter burns food and measures the calories (energy) it contains. Ask which nutrients supply calories - (carbohydrates, fats, and proteins).
8. The Atomic Absorption unit measures the trace minerals contained in the ashes. (Students enjoy learning that this is the instrument used by the FBI to match paint specks in a hit and run victims clothing with the car doing the damage.
9. The Auto-Analyzer measures the proteins, calcium, and iron found in food. This same instrument could be used to detect the presence of drugs in human blood streams.
10. The Centrifuge is used to separate blood cells from the blood plasma. Then both are analyzed to measure the health of the animal.

11. Point out a sample of blood and emphasize that taking periodic samples is essential if the food's value is to be accurately evaluated.

12. Point out a sample of ashes - red samples demonstrate the presence of high levels of iron oxide (a food coloring).
13. Discuss the jobs a plant like Theracon will have:
    1) One or more PhD'S in nutrition will be directing the studies, depending on how much research work is needed.
    2) One Food Technologist with a master's degree will be figuring out how to make the foods with the nutrients recommended by the nutritionist.
    3) One Medical Technologist or a well trained high school graduate will usually run all of the laboratory equipment.
    4) One business major will manage the operations, keep the books, and so on.
    5) One secretary will handle the research reports and correspondence.
    6) Six or more high school graduates will handle the dogs, make the foods, keep the records and so on.
14. Review the things which Theracon must test before releasing a diet:
    a. Is the food palatable?
    b. Is it digestible?
    c. Is it nutritious?
    d. Does it cause diarrhea?
    e. Does it look good to the owner, so that he will buy it?
    f. Is it inexpensive, so that it will be purchased?
    g. Are all of the ingredients easily obtained at all times?

Visit the cat pens.

1. Point out that the double wall keeps stray cats and other animals from infecting and fighting with the penned cats.
2. Review the health reasons for keeping the animals outside (cats are particularly susceptible to disease).
3. Review the reasons for placing cats only on nutritious diets. (If you don't, they may refuse to eat a nutritious diet when they do get sick.)
4. Check the buildings and lots to the North. Theracon frequently does research on large animals (ranging from horses to deer) to determine nutrient requirements and the effects of drugs on nutrient utilization.

3. The German Shepherds are used because they are becoming very common and are frequently under high stress. They require a different diet with more energy than used with the Beagles.
4. Theracon also does occasional work with other large dogs, such as Great Danes. These dogs grow so fast that they will frequently have nutritional deficiencies. To compound the problem, owners try to buy inexpensive food which may not be nutritionally complete. Theracon makes sure that every diet has enough calcium and energy to satisfy the animals.
5. All animals are housed outside when possible, because they remain much healthier (even when it is 0° F). Their houses are insulated, their fur coats grow thick, and the wind and sun destroy and disperse most diseases. Ask students which nutrients keep the dogs warm by providing energy (carbohydrates and fats).

Food Testing Laboratory (10 minutes)

Point out and explain these tests and their instruments:

1. All food and feces are carefully weighed and dried in drying ovens. This determines water content and is a most important step, because the nutritional content of canned food (75% water), urine (99% water), and dried food (10% water) could not be compared without prior drying. Note: Ask the laboratory technician if you can open the drying oven and ashing oven before doing so. You may get some very unpleasant results by opening at the wrong times!
2. The dried food is ground-up in a blender.
3. Part of it is burned until only ashes remain (open the oven if possible). Ask students what nutrients will remain in the ash minerals. Have them name 4 minerals (calcium, iron, copper, zinc, iodine, etc.). Have them give foods containing calcium (milk group-name several foods) and iron (meats, beans, eggs, peanuts, and peas).
4. Part of the food is digested in acid to measure the protein content. Ask what acids are contained in proteins. Have students name some high protein foods.
5. Part of the food is digested in acids and bases, and the indigestible fibers are measured. Ask students why fibers are useful to the animal. (They help keep the intestine running correctly). Have students name some foods high and low in fiber (Lettuce, carrots and celery, etc. are high. Milk, cheese, and cokes are quite low).
6. Part of the food has ether dripped over it and the fat is extracted and measured. Ask students to name 3 ways that fat helps the body (energy, vitamin "towing", and skin conditioning).
7. The calorimeter burns food and measures the calories (energy) it contains. Ask which nutrients supply calories - (carbohydrates, fats, and proteins).
8. The Atomic Absorption unit measures the trace minerals contained in the ashes. (Students enjoy learning that this is the instrument used by the FBI to match paint specks in a hit and run victims clothing with the car doing the damage.
9. The Auto-Analyzer measures the proteins, calcium, and iron found in food. This same instrument could be used to detect the presence of drugs in human blood streams.
10. The Centrifuge is used to separate blood cells from the blood plasma. Then both are analyzed to measure the health of the animal.

11. Point out a sample of blood and emphasize that taking periodic samples is essential if the food's value is to be accurately evaluated.

12. Point out a sample of ashes - red samples demonstrate the presence of high levels of iron oxide (a food coloring).
13. Discuss the jobs a plant like Theracon will have:
    1) One or more PhD'S in nutrition will be directing the studies, depending on how much research work is needed.
    2) One Food Technologist with a master's degree will be figuring out how to make the foods with the nutrients recommended by the nutritionist.
    3) One Medical Technologist or a well trained high school graduate will usually run all of the laboratory equipment.
    4) One business major will manage the operations, keep the books, and so on.
    5) One secretary will handle the research reports and correspondence.
    6) Six or more high school graduates will handle the dogs, make the foods, keep the records and so on.
14. Review the things which Theracon must test before releasing a diet:
    a. Is the food palatable?
    b. Is it digestible?
    c. Is it nutritious?
    d. Does it cause diarrhea?
    e. Does it look good to the owner, so that he will buy it?
    f. Is it inexpensive, so that it will be purchased?
    g. Are all of the ingredients easily obtained at all times?

Visit the cat pens.

1. Point out that the double wall keeps stray cats and other animals from infecting and fighting with the penned cats.
2. Review the health reasons for keeping the animals outside (cats are particularly susceptible to disease).
3. Review the reasons for placing cats only on nutritious diets. (If you don't, they may refuse to eat a nutritious diet when they do get sick.)
4. Check the buildings and lots to the North. Theracon frequently does research on large animals (ranging from horses to deer) to determine nutrient requirements and the effects of drugs on nutrient utilization.

Saving Money and Energy

The following tips will help save your family money and conserve energy.

1. Cook food using pans with tight-fitting lids whenever possible.

2. Don't boil more water than you need, and reduce the heat as soon as the food boils - liquid is at the same temperature, whether it boils fast or slow.

3. Prepare double or triple quantities of foods that take a long time to cook - stews, soups, spaghetti sauce - then freeze the unused part. It costs less to store and reheat than to start from scratch.

4. When possible, use electric skillets, rather than electric stoves, but use gas stoves to save the most energy. (2/3 of the energy used to make electricity is wasted before it reaches the home.)

5. For foods that require long cooking, it's more economical to use the oven.

6. Don't oven-peep. It's bad for baked goods, and there's a heat loss of as much as 20% every time you open the door.

7. Don't preheat the oven when you're going to roast large items. It's not necessary and wastes heat.

8. Set the refrigerator for 34° to 40° F. and the freezer for 0°. Check the temperature carefully. Settings below these numbers waste energy.

9. Defrost the refrigerator before its walls accumulate more than a quarter inch of ice.

10. Close a crisp dollar bill in refrigerator and freezer doors. If it pulls out easily, cold air is escaping and new gaskets are needed.

11. Open refrigerator and freezer doors as infrequently as possible. It costs about a penny every time the door is opened.

12. If you have a home freezer, either empty it and turn it off, or fill it. Half full freezers require the most energy.

13. Use standard, NON-frost-free refrigerators. Side by side refrigerators and frost-free models use 50% more energy and dollars to run.

14. Make sure that air conditioning and furnace filters are checked every other month and cleaned or replaced when necessary.

15. Have a professional clean the furnace yearly. This will cost about $50, and will save $50 plus a lot of energy. 1 millimeter of soot (1/50th of an inch) on the heat collecting plates will cause you to burn twice as much gas in a winter!

16. Installing at least 3½" of ceiling installation in older houses will pay for itself within two to three years, and will save energy in summer and winter.

17. Don't allow furniture or drapes to cover heating or cooling vents.

18. Install storm windows and doors, put double pane glass over picture windows, and weather strip and caulk windows and doors.

19. Close the damper in any fireplace when not in use - 20% or more of the house's heat will go right up an open chimney.

20. Insulate your body and cool the house. Wear a sweater.

21. Do not wash dishes under hot running water - use a stoppered sink to wash and rinse. Don't use a dishwasher.

22. Wash clothes in cold water when possible. Don't dry in a machine. Indoor lines with wet clothes increase the humidity and make the home feel warmer while drying your clothes for nothing.

23. Open the tap at the base of most water heaters and drain the sediment out monthly. This can save 10% of the money spent on water heating.

24. Use a standard, small water heater, not a quick recovery model which wastes much more heat.

25. Divide the BTU rating of your air conditioner by the number of watts it uses. If the result is less than 10, you have an inefficient and expensive machine (and some are very inefficient).

At the request of several teachers, this paper was written after the student manuals were published. It does not blend well with the overall thrust of this module, but could profitably be duplicated and distributed to all students.

For more information about decreasing the use of energy in the house and nation, consult the module "Electrical Production and Pollution Control." This contains a much more extensive treatment of energy and its use in our society.

BEST COPY AVAILABLE

Transparency 1
Teacher
Paper E
Page 18

Module: 4

DAILY FOOD CHART

Food — Nutrient Values in Percentage

	Calories	Calories %	Protein %	Calcium %	Iron %	Vitamin A %	Thiamin %	Riboflavin %	Niacin %	Ascorbic Acid
DAILY TOTALS										

BEST COPY AVAILABLE

Module: 4

Transparency 2
Paper D

NUTRITION WORD GAMES

The words we've found are indicated below.

A R I B O F L A V I N E I G P
C A R R I A G R I R U N T I D
A S O O K I E A T D P U T T I
R U N G D T R R A A B I T E C
B O P M I I I O D I N E S L A
O R A O C C A S I R O N O N O
H O L I K E N O S E L O N G N
Y H A E M S I L O B A T E M I
D P T V I T A M I N S A B D M
R S A I N H C O O K C A S H A
A O B T E I I U T C O P P E R
T H I S R A N I H H R C I C I
E P L T A M K P E U B A A L S
A N I O L I A B O T I L E E K
C I T E R N A F N M C O L I G
I G Y N D E C E O I A R I G E
23. T A S T E I I S U R C I H G T
O A S T B R G M I I I E A C N
R I F A T S O E G K D S A C P
S O B U R O N E S I H O G Y U
U H N C O L A A M T R O G E R
26. A P P L E O A C E H I C A E P
S E K W A S H I O R K O R G I
Y L T A C G P R O T E I N A L

1. riboflavin
2. carbohydrate
3. amino acid
4. phosphorous
5. eat
6. bite
7. palatability
8. iodine
9. iron
10. niacin
11. mineral
12. ascorbic acid
13. metabolism
14. vitamin
15. thiamine
16. cook
17. cash
18. copper
19. calories
20. calcium
21. nutrient
22. digestion
23. taste
24. fat
25. cola
26. apple
27. Kwashiorkor
28. protein
29.
30.

Module: 4

BEST COPY AVAILABLE

Transparency 3
Paper D

	1 C	2 A	R	B	3 O	H	4 Y	D	R	5 A	T	E		6 M
7 H	A	M			L		O			M				E
	8 L	I	9 D		E		U				10 D			A
11 N	O	N	E		O		12 N	U	T	R	I	E	13 N	T
	14 R	O	A	R			G				G		O	
	I		D			15 F				16 B	E	A	N	S
17 Y	E	18 S			19 P	A			20 C		S		E	
21 E	S	T	I	M	A	T	22 E		H		T			
L		E			L		G		E					
L		A			23 A	N	G	24 L	E	F	O	O	D	
25 O	A	K			T		26 S	I	S					27 M
V				28 C	A			29 V	E	N	30 I			I
			31 H		B			E			32 R	O	L	L
			2		L			R			O			K
	33 P	R	O	T	E	I	N		34 S	U	N			

Teacher
Transparency 3A
Paper H

Module: 4

Contents of Two Dog Foods

Nutrients

		Diet A	Diet B
1.	Crude Protein	8.0% minimum	14.0% minimum
2.	Crude Fat	2.0% minimum	5.0% minimum
3.	Crude Fiber	1.5% maximum	1.5% maximum
4.	Ash	3.5% maximum	2.0% maximum
5.	Phosphorus	0.5% minimum	0.28% minimum
6.	Calcium	0.35% minimum	0.34% minimum
7.	Salt	0.5% maximum	0.43% maximum
8.	Moisture	74.0% maximum	78.0% maximum

Ingredients

		Diet A	Diet B
1.	Protein Sources	Meat by-products Soybean meal, navy beans	Horsemeat, Meat by-products
2.	Cereal Products	Barley, Wheat bran	None
3.	Vitamin Supplements	Irradiated dry yeast(D2)	Irradiated dried yeast(D2), B12, Niacin, Riboflavin, Thiamin, Choline, E, Pyridoxine, Folic acid
4.	Mineral Supplements	None	Calcium, iodine, copper, manganese, cobalt, zinc
5.	Food Coloring & Preservatives	Iron Oxide & Sodium Nitrite	Sodium Nitrite